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ABSTRACT

This document contains three research reports dealing with teacher education in the U.S. "Changing Patterns of Teacher Education," by Atkin and Raths, attempts to (a) highlight innovative trends in preservice and inservice training; (b) outline relevant political, economic, and social factors; and (c) identify resulting policy issues. "The Effect of Innovations on Staffing Patterns and Teacher Roles," by Hyer and McClure, discusses 14 innovative practices now being used. The paper focuses on (a) rationale for adoption; (b) changes which resulted in instructional strategies; (c) teacher tasks and staffing patterns; (d) changes in resources; (e) use of technology and building design; (f) capital and operating costs; and (g) evaluation. "Staffing Patterns and Costs in Alternative Educational Futures," by Kiesling, discusses four promising educational practices that may be available by the 1980s. The first section of this paper discusses likely ramifications of present-day educational innovations. Section two presents four types of future schools which are suggested by present reforms. Section three illustrates staffing and cost ramifications and estimates. The appendix is entitled "Individualization of Instruction and Educational Reform and Criticism." (JS)

NEW PATTERNS OF TEACHER EDUCATION AND TASKS

country experience

UNITED STATES

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PREFACE

Within the framework of the programme of work of the Education Committee, the OECD has over the last few years undertaken an analysis of various aspects of teacher policies in primary and secondary education.

At the heart of the problems which confront Member countries in the transformation of the teachers' roles are teacher education and new pattern of teacher tasks. These problems were analysed in an earlier OECD publication: *The Teacher and Educational Change - A New Role*.

Work and discussions among experts have led to a series of preliminary conclusions concerning trends in the two areas mentioned above and these have been published under the title: *New Patterns of Teacher Education and Tasks: General Analysis*. This analysis was based on a number of case-studies of innovations in Member countries, which seem to respond to some of the key questions in the future development of the teaching profession.

The interest shown in these analyses has encouraged the Secretariat to publish the most significant of them in a series of volumes. Each volume contains either country studies dealing with both teacher education and teacher tasks or studies which concern the more general aspects of training policies and changes in teacher tasks and working conditions.

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I

CHANGING PATTERNS OF TEACHER EDUCATION

by

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SUMMARY

The objectives of this report are to highlight innovative trends in pre-service and in-service training of teachers in the United States; to outline some political, economic, and social factors that provide context for these trends; and to identify resulting policy issues. The analysis was conducted by reviewing descriptions of teacher education developments and by ~~visiting~~ selected sites.

There is no single pattern that characterizes recent developments in the initial and continuing education of teachers in the United States. Political conflicts emphasize questions of control of teacher education, and the contending groups include universities, legislatures, executive branches of government, state education agencies, local public school districts, and the organized profession. Ideological differences have led to the establishment of dozens of programs, sometimes at a single institution, that stress different goals. In some instances, a business and industry metaphor is prevalent in the programs; in other instances a "growth and development" metaphor based on the abilities and predilections of the individual student is prevalent.

Key policy issues focus on recruitment of teachers, the requirements for a teaching license, the question of control of teacher education, the determination of an appropriate scientific base for educational practice, effective strategies for teacher education, the degree of standardization that is necessary and desirable, the relationship between teacher education activities at a university and other functions of the university, and finally evaluation and description of the hundreds of different teacher education programs that are found in the United States.

I. SOME CONTEXTUAL FACTORS

A. Governmental Influences: Planning and Management

While there is little attempt to coordinate national or state policy in housing, welfare, transportation, health, education, and other human services in the United States, trends in these fields are not entirely independent. During any single administration, there is a discernible cast to both the substance and the style of social policy formulation and its implementation, partly because of the philosophical and political beliefs of each president and state governor.

True, the differences in approach to the various spheres of social policy are as apparent as the similarities. A physician is usually considered to be self-employed (though he often works in a facility supported by the public). A teacher is under contract to a governmental unit. As a result, policies differ as attempts are made to manipulate, for example, the incentive systems. Nevertheless, governmental policy in health, transportation, welfare, housing, and education in recent years has been characterized by features such as the following: efforts to determine in as unambiguous a fashion as possible the objectives of the various "delivery systems", administrative guidelines that systematize strategies for the attainment of the specified objectives through sophisticated managerial techniques, ambitious attempts to measure benefits against costs, firm rhetoric asserting the primacy of local initiatives and responsibility, options that increase certain elements of choice for the "consumer", and pressures to cut costs - particularly costs to the taxpayers.

Regardless of the partisan political bases for the goals advanced and articulated by any particular administration, policy analysis characterised by such procedures has become a prominent feature of governmental planning -- especially since the early days of the Kennedy administration in the United States when Robert McNamara began to introduce highly rationalized management procedures into the operations of the Department of Defense. It is a central contention in this report that teacher education patterns have gradually become more responsive to governmental and political pressures and trends such as those outlined above, and concomitantly somewhat less responsive to traditional sources of initiatives within the profession during the past ten years. The same statement can be made of medical and social work education. And the reasons are attributable in significant measure, though not entirely, to the aggressive implementation of certain governmental planning and management techniques. Therefore some of these techniques will be sketched in the following paragraphs to establish part of the social, political, and economic contexts for an examination of teacher education development.

For the avowed and laudable purposes of reasserting civilian control over military operations in the early 1960's, McNamara introduced to the Department of Defense decision-making procedures that attempted to move away from adjudication of the claims and demands of competing special interest groups solely on the basis of power and influence, and toward objective analysis of goals and costs. For example, instead of balancing the pressures within the Navy for greater attention to submarines as against battleships, or weighing Air Force proposals against those of battleship admirals, McNamara demanded a clear delineation of the objectives for which the military system under consideration was to be designed; he then demanded careful analysis of alternative methods of achieving the objectives, including detailed projections of the costs of each of the alternatives. Decisions were made based on assessment of objectives, costs, and benefits. It was thought that this procedure, taken directly from industrial management, served to wrest control from narrow specialists who were seen as protecting existing though possibly outmoded practices and power, thereby putting responsibility more clearly in the hands of elected political leaders.

President Johnson was powerfully impressed with the McNamara approach in the Pentagon. He mandated in 1965 that all cabinet officials employ henceforth the managerial techniques brought to the Pentagon by Robert McNamara -- and in each of the federal agencies. The Department of Health, Education, and Welfare was, and is, in the forefront of an attempt to use the new managerial styles -- in part because health, welfare, and education expenditures are huge, and rising, and seemingly uncontrollable.

In the United States, education is a responsibility of each of the fifty states rather than a primary responsibility of the Federal Government. However, in each of the fifty states techniques developed at the national level have begun to assume greater prominence because the tools of management and planning touted in Washington seemed powerful to the governors. Just as the President amassed a huge budgetary staff in a unit now called the Office of Management and Budget, each of the state governors has built a budgetary group, often formally constituted in a unit called a Bureau of the Budget. The Office of Management and Budget and the state-based budget bureaux have been staffed overwhelmingly with individuals trained in management, business administration, economics, and operations research. One of the results of this particular trend is the demand for incontrovertible data as a basis for policy as well as a justification of expenditures.

While the current political mood in America diminishes some of the power of federal agencies, the techniques of program planning and management developed in Washington, then, have migrated to the individual states. It is somewhat ironic that at a time when Washington officials have become somewhat skeptical about the advantages of planning programming budgeting systems and operations research, particularly in the social sphere, state legislatures and state executive departments sustain undiminished enthusiasm for the techniques. One reason for the disparity between Washington and the state governments may be that Washington agencies have had more experience. But it is also probably a fact that the managerial techniques are used as much to cut costs as to improve policy. Accountability laws are passed in the various state legislatures partly as a method for developing a seemingly rational plan for executive and legislative decision-making that seems to require a reduction of expenditures.

B. The Scientific Base for Educational Practice

A closely related expectation of educational planners is for "objectivity" in educational discourse and decisions. There is, as a result, a quest for establishment of the scientific basis for educational practice, including teacher education. If scientific principles can govern educational practice, the resulting rationality diminishes the influence of powerful interest groups and special pleading.

There are additional benefits to employing scientific styles of discourse when discussing educational policy and practice. Science tends to be valued highly. Scientific and highly rationalized terminology often mask controversial assumptions underlying any attempt to modify teaching. For example, approaches to instruction based on behavior-modification theory and proximate positive reinforcement are usually advocated on the basis of laboratory experiments that demonstrate the apparent efficacy of these techniques in teaching skills like computation, reading, and spelling. The values that underlie such approaches to human learning are less subject to challenge if it is assumed that scientifically-derived practices represent clearly superior approaches to those derived primarily from tradition without a similar scientific base.

It is characteristic of policy analysis at both federal and state levels that specialists in the various social service fields are viewed with suspicion. Because we are not pleased with health care systems or educational systems, and because the provision of these services is expensive and growing more so, there is a widespread view that professionals must be more responsive to the public they serve. Just as it is asserted that defense is too important to leave to the generals and admirals, and medicine too important to leave entirely in the hands of physicians, it is said that education is too critical an enterprise to be left entirely in the hands of professional educators. Highly sophisticated management procedures, based where possible on scientific research, seem an appropriate method of improving social accountability. Research findings offer a method of freeing policy formulation from the overriding influence of professionals. However, while there must be a continuing search for a scientific base for educational practice, even those researchers who are most committed to this quest usually acknowledge the primitive nature of the present scientific base of teaching or teacher education.

It is a question how well the prevalent planning styles in the United States match the state of rationality of the teaching or teacher education enterprises. The techniques brought to the Pentagon by Mr. McNamara accommodate poorly to ambiguous data, conflicts in values, confusion over goals, and lack of agreement about priorities.

To anticipate one of the recommendations of this report, we do well to separate the scientific and readily rationalizable aspects of teacher education from considerations of worth, purpose, and desirability. Where a rational base is firm, it should be used. But not all educational discourse yields to objective analysis. What is lost and what is gained when we move away from a style of decision-making based primarily on judgments of informed practitioners that, however poorly, accommodate many highly impressionistic data and toward procedures that demand objectivity but as a result may focus on events and outcomes that mask controversial philosophical assumptions? This question is paramount but all too frequently ignored.

C. Ideology and Politics

As a matter of fact, as will be stressed repeatedly in this report, there are powerful ideological crosscurrents in American teacher education that reflect competition for power among different groups as well as basic philosophical disagreements. This report describes programs at certain teacher education institutions that essentially consist of dozens of programs from which the student may make his choice based on inclination and aptitude. At other institutions, performance-based teacher education programs have been established that seem to be a result of a dispassionate analysis of the competencies required by teachers, followed by systematic attempts to train prospective teachers for these skills. At still another teacher education institution, the emphasis is on "humanizing" the teacher education experience, which often means that the prospective teacher is expected to learn about himself as an individual before he can interact effectively with learners.

In the United States, the array of teacher education programs can be characterized by those who are pleased with the system as "diverse" and by those who are less satisfied as "chaotic". But despite governmental pressures toward systematic analyses of these programs, there is so little agreement in the United States about what characterizes an effective education in elementary or secondary schools that there is no clear pattern in emerging teacher education programs -- unless that pattern is patternlessness.

Furthermore there is general dissatisfaction with teacher education, as there is with education generally, as there is with transportation policy, as there is with health delivery policy, as there is with social welfare policy. Americans in the 1970's are disenchanted with their bold social policy initiatives of the 1960's. Brave new plans were set into motion then in housing, transportation, education, race relations, and many other fields. Huge expenditures were directed toward alleviation of human injustice and ignorance. Ambitious claims were made by those officials who advocated the new programs, partly to hasten passage of needed legislation. However, the programs fell short of the expectations, and disillusionment has set in.

The Congress established housing programs that seem to have destroyed a sense of community, transportation programs that seem to have clogged urban areas and destroyed the environment, criminal justice programs that have not reduced the rate of recidivism, and educational programs that do not seem to have raised reading levels or improved employability, particularly of the poor.

A retreat from the rhetoric of the 1960's characterizes the early 1970's. At the same time welfare and health costs have soared, inflation rates are unprecedented, and governmental administrators and legislators are seeking to hold down public expenditures. The new, sober mood in Washington has resulted in fewer federal initiatives in all fields, including teacher education. There is the conviction that complex social problems are not as tractable as government planners thought in the 1960's. For whatever reason, the shiny plans do not result in many heartening practices; the dreams turn sour.

The mood of disillusionment in Washington matches a political philosophy that emphasizes the importance of local control and state-based decision making. To a degree, this development is associated with Watergate, but many observers believe that the Nixon administration would have turned considerable authority for social policy formulation back to the individual states as part of his "New Federalism" and his plans for "revenue sharing" regardless of Watergate-related developments.

All of these events are transpiring at a time of sharply decreasing birthrates and therefore a lowered demand for formal schooling in the younger age groups, at a time of dramatically altered supply and demand picture for teachers, in a period wherein the teacher profession is organizing rapidly and militantly, and in a period wherein there is a financial and enrolment crisis in higher education.

Accompanying the ideological conflict and confusion, as might be imagined, is a highly-charged political climate in the teacher education field with various groups competing for control: colleges of education, the organized profession, academics from the arts and humanities, and public school districts, to name just a few.

D. Governance of Teacher Education

While the governance of teacher education is not the primary focus of this report, any description of emerging patterns of teacher education in the United States must emphasize questions of control because of the ideological chaos in the field. If the scientific base for educational practice and teacher education is primitive, and seemingly uncontrollable governmental expenditures are soaring, then the roles of legislatures, budget bureaux, state education agencies, teacher certification boards, and the courts become influential in a fashion unknown in nations that may be less heterogeneous than the United States, or nations wherein the responsibilities for the formulation of educational policy are more unambiguously established.

The state and federal legislatures exert pressure of at least two kinds. Legislators frequently enunciate policy themes such as educational equality, the need for pre-school education, improved access for adult education, and opportunities for career education. At the same time, political figures in the legislatures and executive departments clamor for results.

The Federal Government enters the education scene out of a sense of national emergency, as was the case when the Soviet Union launched the first space satellite and the American military posture was seen as threatened or as an agent to protect constitutionally-defined human rights, as when school busing was mandated to redress the educational deprivation resulting from racial isolation. It is on the latter grounds that federal courts have become particularly active in educational matters. The courts have pressed for plans that promote more equal financing of schools in wealthy and poor districts within a state, for example, just as they played a key role in 1954 in declaring the "separate but equal" doctrine of racial isolation inherently unequal, as part of their attempt to blanket education under the "equal protection" provisions of the national Constitution.

In recent years several state legislatures have passed "accountability" laws. The laws take different forms in the various states in which they have been enacted. In some places it is mandated that performance objectives be established for the various school programs and data collected revealing how well the objectives are achieved. In a similar vein, some states have required by law that performance-based teacher education programs be established. In other states the same purpose has been achieved by actions of the teacher certification boards. These actions result in considerable measure from a distrust of professional educators and disappointment in educational achievement test scores, particularly of poor children.

Few observers expect potent Federal initiatives in the education field in the 1970's. However, especially if the states receive funds through revenue sharing plans from the Federal Government, the various state legislatures may attempt to modify educational practices to a marked degree. Political forecasting is an inexact enterprise, however. While there are significant similarities across the fifty states, there is likely to be considerable variation in legislation affecting teacher education, and the pattern is nowhere clear enough to make confident predictions.

Let us turn to an examination of the emerging teacher organizations in order to portray one force of growing significance in the governance of American teacher education. From teacher groups that aimed primarily to improve communication and professional identification, the teaching profession in the United States has moved rapidly in the past ten years toward trade unionism. For a variety of reasons, including the fact that education has no cohesive or strong voice in the United States despite the huge size of the profession, and teachers have seen themselves particularly vulnerable to governmental economizing, the teacher organizations have become more assertive and even strident.

In the 1966-67 school year, there were 54 organized work stoppages among teachers involving 45,000 employees. In 1969-70, the number rose to 230 stoppages involving 117,000 employees. In 1972-73, the number of stoppages totaled 143 and about 115,000 teachers were involved.

One point of focus of teacher concerns (beyond the overriding issues of salary and working conditions) is the question of entry into the profession and continuing training. Organized teacher groups are demanding a greater role in the certification and licensing procedure, partly to hold down the numbers of teachers seeking positions in a period of apparent high supply and low demand, and partly to play a greater role in designing preparation programs that often are seen as insufficiently practical and too highly theoretical. Teacher groups have been successful in recent years in changing the composition of teacher certification boards in several states to include more representatives of the organized profession. It is too early to gauge the full effect of this greater political power, but it is likely within a decade that teacher groups will exert influence at least as great as that of the organizations of school administrators in the development of training programs, in-service and pre-service.

At the moment teacher organizations in the United States are not united. The largest group, consisting of about 1,500,000, is the National Education Association. This group is unaffiliated with the trade union movement and derives its power from state-based affiliates that vary in size, influence and viewpoint. The American Federation of Teachers is affiliated with the AFL/CIO. It is a smaller group consisting of 400,000 members with its major power bases in New York and Chicago. While there is a widespread expectation that the two groups will merge, that expectation has existed for several years, and the merger has not yet been consummated. If and when it happens, the influence of the organized profession will become much stronger, and its role in teacher education, particularly but not exclusively continuing education of teachers, may well be paramount.

There is considerable sentiment within the organized teaching profession that the universities have come to play too great a role in teacher preparation and certification. While the goals of the teaching profession expressed through the formal organizations are not yet clear, there are discernible pressures toward the model of law or medicine. In these fields, practitioners play a key role in the licensing process, and the training institutions, though usually housed at universities, enjoy considerable autonomy from the other divisions of the university. A major emerging issue in teacher education in the United States, anticipating another conclusion in this report, is the degree to which teacher education should be integrated with university education broadly. As will be seen, there are strong (though at the moment few) pressures toward "professionalization" and independence.

For several decades, teacher education in the United States has been fully incorporated into the university, unlike the situation in many European countries. Aspiring teachers receive the bachelors degree after four years of study; in fact it is required for certification in each of the fifty states. No one is seriously suggesting a return to the American normal schools even as autonomy in teacher education is advocated. Separate and exclusive teacher education institutions are practically non-existent at present in the United States. Those state-supported institutions that were created sixty and seventy years ago exclusively for the preparation of teachers have almost all by now become comprehensive universities. In fact the teacher education function has been de-emphasized as these colleges and universities have attempted to emulate the broad-based institution of higher learning. Arts and sciences have been stressed, rather than the professions.

At the present time, responsibility for teacher education, pre-service and in-service, resides almost exclusively in various colleges of education that are integrated into universities. All of the emerging practices described in this report have begun to take root at such institutions. While there will be continuing pressures to shift the locus of responsibility to either local school districts or to the organized profession or to both, and while legislatures and the courts will influence the system, it is unlikely as far as organization of teacher education is concerned that these pressures will do more than increase the number of cooperative relationships among teacher education institutions, local education authorities, and units of the organized profession.

While it is true that local authorities and the organized profession have begun experimenting with teacher centers (somewhat after the British model) as focal points for in-service teacher education, it is likely that even continuing education will never be separated completely from universities. Rather, existing colleges of education will likely share in the total effort cooperatively with the new groups demanding a larger role. The results, as past practice and present trends portend, will probably be non-uniform and diffuse.

E. A Cautionary Note

While the cases in this report were chosen deliberately to demonstrate diversity and to provide the reader with some understanding of the range of new programs being developed in the United States, the study accurately conveys a picture of minimal uniformity and standardization. And variations are still emerging. There is no clear pattern.

Insofar as governmental agencies mandate the use of managerial techniques such as prespecification of educational objectives, and "accountability" laws are passed in various states to match educational achievements against educational objectives, and a business mentality takes even firmer root in American social policy formulation, then substantive uniformity may follow procedural orthodoxies. The move toward performance-based teacher education in the United States, perhaps the single most powerful trend in American teacher education, is essentially a "management by objectives" approach drawn from standard industrial and business practice: PBTE leaders even talk about "products" of the system. Various legislative actions and the apparent attraction to PBTE among colleges of education suggest that this movement may indeed be the major wave of the next several years.

Nevertheless American educational policy during the last twenty years has been characterized by a rapidly changing series of fresh priorities. It is not at all clear that today's major educational problem or panacea is tomorrow's. Indeed recent history suggests the contrary. In the early 1960's Americans were concerned about education of the gifted. This focus was replaced after a few years by initiatives to improve education of the poor, particularly of poor blacks. One Commissioner of Education in the late 1960's proclaimed the highest priority in American education as the right to read. His successor shifted to career education. And so it goes. There is considerable faddism in American education, including teacher education. Each new priority is highlighted in the popular press and the professional journals, then forgotten a few years later when the next crisis claims professional and popular attention.

But to this point, despite the passionate and often contentious rhetorical fireworks, the major characteristic of the American educational system, including teacher education, has been its inertia. It is a large system. The millions of people who are responsible for sustaining it, for making the day-by-day decisions, will probably continue to control its destiny to a greater degree than governmental proclamations or editorial exhortations. The reader is cautioned that the innovative practices described in the report are not widespread - only suggestive. They are presented to outline the practices featured by the "opinion leaders". But the opinion leaders have not yet found a way to affect American education profoundly, though their writings flood the journals and their speeches resound through the halls at professional conventions.

Only those who staff the system can make significant changes, and these teacher educators, like the teachers in the public schools, tend to modify practice slowly. They draw from the new techniques those that seem to match their own tastes and abilities, rejecting the others not obviously or loudly, but rather by inaction. Overall educational change is slow in a huge system, a fact continually disappointing if not frustrating to those people in the profession and in government who are convinced that they know the steps necessary to improve practice and make schools more effective.

Some of the policy implications of this diffuse and clouded teacher education picture will be suggested later in the report - after a documentation of some of the specific and conflicting trends.

II. THE PATTERNS

This section of the report describes the highlights of certain innovative teacher education programs found in the United States. Several serious limitations in the accounts of these programs must be cited at the outset. Many of the descriptions included here are based on the documents that were assembled at the various sites during the course of our visits. Because programs evolve, because written materials as such cannot completely convey the nuances of programs that their sponsors feel are quite important, our report may not represent entirely accurately what is in fact being done in these locations. We had neither the time nor the resources to assess completely the accuracy of the descriptions we received.

A second serious problem facing anyone attempting to describe something as amorphous as a teacher education program is that of selective perceptions. The elements we chose to report in our description obviously represent only a small part of what we could have included in this narrative. It is likely that the developers of the programs we visited would have chosen to highlight different aspects of their programs or would have elected to highlight them in different contexts. We apologize in advance to these developers and to the reader for any distortions we have introduced into our descriptions and trust that our colleagues will in good spirit help to correct any inaccuracies.

A. Offering of Options

A definitive trend in teacher education in the United States is that of single institutions offering multiple programs in teacher education. Students interested in becoming elementary school teachers at these institutions can elect an off-campus or an on-campus training program; can choose a series of courses geared toward urban education or stay in a mainstream of courses aimed at the general population of students; can select a program with a particular philosophical bent, such as behavior modification or open education, etc. An institution that is singularly and prominently characterized by the offering of an array of programs is the University of Massachusetts. Recently, the School of Education of the University of Massachusetts was presented a "distinguished achievement" award from the American Association of Colleges for Teacher Education (AACTE) for the more than twenty teacher education programs offered there. The award is an indication that options are considered exemplary practice.

The presentation of an almost bewildering number of alternative programs to students headed for the teaching profession is based partly on a lack of confidence in the efficacy of the governing process as it is usually practised by university faculties. "We do not believe that a program orthodoxy within a School of Education faculty should be decided by a 5-4 vote," said Dean Dwight Allen during our visit to the University of Massachusetts, "and neither do we believe that a program should be so bland as to be acceptable to all competing views. The way out is to have multiple programs." Additional arguments given in support of multiple programs included the following: No one knows the best way to prepare students for a teaching role. In fact, many people are stimulated by and committed to ideas of preparing prospective teachers in particular and different ways. Commitment on the part of faculty and students to a program would increase to the degree that the faculty could design, control admissions, and operate the program on their own terms and to the extent that the students could choose to select the program.

To administer the number of options available to students, to screen proposals for new programs, and to consider termination of unsuccessful ones, the School established a Teacher Preparation Council. This group, composed of ten faculty members appointed by the Dean, passes judgment upon proposed programs emanating from interested teams of faculty and graduate students. In general, programs are approved if they meet the following guidelines adjudged by the Council [17]:*

"1. The proposed program or component should have an explicit and thoughtful rationale. The rationale should include:

   a. An explanation of the goals of the proposed program in terms of teachers, learners, schools and the wider society schools serve. (An explicit goal of combating racism must be included here.)
   b. An explanation of how the various components of the proposed programs are designed to reach the goals and how they relate to one another.
   c. A reasoned explanation of the learning theory implicit in the program.
   d. An explicit statement of the terms in which the success of the program is to be assessed.

2. A major component of any program should be in the clinical area and should involve working with other learners of other ages. We do not intend that these other learners necessarily be children nor do we intend that the clinical component be necessarily designed in conformity with current student teaching or internship practices.

3. A major component of the program must be designed to help students develop both the capacity and inclination for reflective analysis. By this we mean essentially the ability to learn from one's experience. It implies learning of a second order -- an ability to reflect not only upon one's own behavior but about the assumptions upon which one's behavior is based."

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* Figures in square brackets refer to Annex I "References".

As an unnumbered afterthought, the statement includes the following postscript: "It[the proposal]will also explicitly define how Massachusetts certification requirements will be met."[2]

To encourage faculty and graduate students to submit proposals for an array of programs, the Teacher Preparation Program Council(TPPC) abolished all existing School of Education requirements, thus removing constraints from the thinking of faculty and graduate students as they defined new alternatives. A second step to encourage creativity on the part of program planners was taken by making arrangements with the Massachusetts State Education Commissioner concerning certification of students completing the University of Massachusetts program. In effect, it was agreed that if the TPPC were to attest that the graduates of the program had met the State certification requirements, then the students would be certified. Both of these steps, the elimination of school requirements and the establishment of an accommodation with the State Certification Director, led to the approval of more than twenty new programs during the several months after the program was inaugurated. Brief descriptions of some of the programs are included here.

a. Urban Teacher Education Program

This program is geared toward "developing teachers who will have political sophistication to the degree they can become reform strategists in the schools and systems in which they teach."[3] Students intern in inter-racial settings in Brooklyn, Pasadena, Philadelphia and in Springfield, Massachusetts. Students in this program are encouraged to develop relationships with students in and out of school by living in school neighborhoods. The off-campus experience is followed up by a period of evaluation seminars on campus designed to identify the student's strengths and weaknesses and to provide additional training in needed skills.

b. Off-Campus Teacher Education Program

This program offers students a chance to do their intern-teaching in the type of school of the student's choice - no matter where the school is located. The Off-Campus Teacher Education Program offers the opportunity for students to work in schools with distinctive programs, such as differentiated staffing, open education, international schools in Europe, schools catering to special populations, e.g. American Indians, deaf children, schools working with the integrated-day concept. Students who have participated in the field aspect of the program are expected on their return to campus to help in-coming students prepare for the student teaching role in these remote sites. Since almost 90% of the students in the School of Education live in Massachusetts, one important goal of this program is that of "deprovincializing" the prospective teachers.

c. Explorations

This program invites students to take a full academic year to pursue their own interests in their own ways with the support and counsel of three co-directors. Student activities in this program include student teaching in public schools, staffing alternative schools, traveling around the world, auditing courses at the University, and many others.

d. Open Education

The University Laboratory School, Mark's Meadow, is the site of a teacher education program dedicated to the concepts of open education. Students are involved in this program over a three-year period with roles explicitly defined from gradual to total involvement in the school's classrooms. There is a strong emphasis here on child development through a case study approach. The Mark's Meadow School is adjacent to the School of Education, but administratively it is part of the Amherst Public School system.

e. Education in Community Services

This program recruits students from a variety of fields all of which contribute to community services: law enforcement, mental health work, community agencies, etc. and works to develop in these persons a greater sensitivity to their own educative roles and how they relate to others' educative roles and to the broader community.

This program assumes that "education is the legitimate realm of a wide range of institutions, and staff members of all social institutions could be more effective if they developed greater sensitivity to their own educative roles"[4]. Students in this program work closely with a University program coordinator in several school locations within Massachusetts. By involving themselves in meetings of community groups, with the work of community agencies, and with the schools, students are able to contribute to weekly seminars in a way that enriches their perspectives of how the functions of all social institutions can be enhanced through cooperation and understanding.

f. Integrated-Day Teacher Education Program

Following the precept of Britain's Plowden Report that "the child is the agent of his own learning," this teacher education program involves students in a full-time commitment over a year's time to working in schools with the integrated-day plan. These students normally take courses at the University in professional education as well.

Other programs that were operational during our visit to Amherst included one in international education - providing cross cultural experiences designed to prepare elementary and secondary teachers to internationalize education in the United States - and a program designed to explore alternative possible futures for society. There is no question that the range of choices open to students in the School of Education at the University of Massachusetts is varied and provocative.

One problem that became apparent within the School of Education as the multiple programs were established was the need to establish some components to service all of the programs. As the number of programs increased and as the number of faculty within each program diminished, it became unlikely that the staff of a given program could teach with appropriate authority all the skills that the students or faculty felt were necessary. To meet one aspect of this problem, a component called "Methods Potpourri" was established. This sub-program is composed of ten or twelve different modules aimed at teaching students techniques in the teaching of reading, arithmetic, science, classroom management, and the like. With the help of their program advisors, students can elect to sample from the offerings in the course in a way that best suits their purposes.

Examples of the "Methods Potpourri" modules available to students during the semester we visited Amherst included the following[57]:

> " - Organizing for Reading: Course included introduction to reading materials, use of class reading time, planning reading lessons, developing reading activities, and grouping for instruction.
>
> - Developing Mathematical Thinking: Whether you "loved" or "hated" mathematics when you were in elementary schools, you probably want your future students to both achieve at and find enjoyment in mathematics. Activities have been designed to develop within you the ability to think mathematically through the use of discovery-oriented questioning and/or manipulation of materials.

- Computer Programming for Elementary Teachers: The rationale for studying programming is based on the assumption that many unclear mathematical concepts can be clarified if students have to articulate their thoughts on the subjects by writing and revising programs designed to "teach" computers.
- Helping Children with Expressive Writing: Students will develop ways of helping children with writing in the belief that writing is as important as reading and should be taught simultaneously with reading.
- Workshop in Elementary Music Skills: An investigation into the process and content of music in the elementary school and how music may be taught as a separate or integrated subject."

Similar courses were offered in art methods, problems in classroom relationships, social studies, and in elementary science curricula. Other components can be added to the program under the aegis of the TPPC to service needs that arise unexpectedly and that are common to several programs.

There are, of course, a number of serious problems associated with multiple programs such as the one described at the University of Massachusetts. A professor and a few graduate students might propose a new program that reflects their particular views and experiences. In a few months, the professor may not be available to continue the offering of the program, in spite of the assurances he gave to the TPPC at the time the proposal was approved.

Furthermore, there is considerable difficulty in assessing the quality of the different programs. At this writing, the only measure that is definitive and universally monitored is that of student enrolments. Once a program is approved, it is left to the faculty of that program to recruit students. If they fail or if students who register for the program subsequently drop out, then almost surely the program will not be continued. But evaluation, other than by market demand, does not at present represent a serious effort by the faculty or administration. Several faculties at the University of Massachusetts School of Education are concerned by what they see as inattention to standards and quality.

In spite of these problems, however, the offering of multiple programs in a single institution is an increasing trend in the teacher education scene in the United States. Most notably, Indiana University and University of California at Los Angeles have adopted programs in many ways similar to those at the University of Massachusetts. Since there is so little agreement about what is appropriate in teacher education, and since conventional modes of justification such as appealing to experts or even to empirical bases are considered suspect, it is likely that this trend will continue for some time in the United States.

B. Teaching for Competencies

A second development in teacher education we have chosen to highlight in this report is having a profound influence throughout the United States: the competency-based approach to teacher education(CBTE), also called performance-based teacher education(PBTE). While of course the issues involved are quite complex and to an extent unexamined, the ideas advanced by the advocates of competency-based teacher education have a logic to them that is as compelling as it is beguiling. Teacher educators are urged to identify the effects that teachers should have on students. Then it is necessary to identify the teaching competencies that will facilitate the generation of the desired effects in students.

To give some estimate of the momentum this movement has generated in the United States, the American Association of Colleges of Teacher Education(AACTE) conducted in 1972 a survey of 1,250 institutions asking which were operating, investigating and/or planning competency-based programs. Of the 783 respondents, a 63% return, 17% said they were operating competency-based programs, 29% said they were not, and a large number(54%) said they were in some stage of investigating the possibility.[6]

It seems quite clear that the antecedents of the current movement include a concern for efficiency that is found throughout the American social system, as documented quite well by Callahan[7] and as outlined in Section I of this report. Performance-based teacher education also has been advanced by the accomplishments in individualization of instruction made by psychologists during World War II as research and development was carried out to improve the training of gunners, bombardiers, pilots, and other military technicians.

It is quite evident that once a goal is well-defined, and it is judged suitable for all students within a class or group, and each student is assumed to be at a different stage in his acquisition of this goal, then each student must be treated differently if the training is to be effective. First and foremost, flexible time limits must be established for students to accomplish the goals. Not everyone will be able to reach the goal simultaneously. Some may have acquired the objective of the course prior to the commencement of instruction. Others may take days, others weeks and sometimes months to attain the objective. Second, several alternative approaches to teaching for the objective must be incorporated into the program to allow for diverse learning styles brought to the group by the various learners. Third, as students progress at different rates through the program, provision must be made to re-group students to take into account spurts in learning that may accelerate some students beyond their peers who started out at similar points.

Almost all of these strategies are found in the rhetoric and the planning of the developers of competency-based teacher education programs. Most of these programs make use of preassessment exercises to place students appropriately in the program. The majority of programs do not place strict time constraints on students. They progress "at their own rate" through the learning activities to which they are assigned. While in some institutions, this procedure has severely taxed the registrars' need for a definite grade at the end of sixteen weeks, in most cases arrangements have been made to defer grades until the student has completed his work at a satisfactory level regardless of how much time it may take. The flexible time requirement idea is further advanced by the use of "mastery exercises" that students can complete to show their accomplishments. Such a procedure allows a student to take the mastery exercise a number of times if he fails to meet the established criterion on an initial attempt. The central components of any well-designed competency-based program are grounded in an effort to improve the efficiency of instruction by taking into account systematically the individual differences of students as they are engaged in the acquisition of specific, pre-defined objectives.

Of course, at the heart of the matter is the quality and usefulness of the objectives to which the individualized program is addressed. Cooper et al suggest that the competencies required of teachers can be classified as those dealing with (a) knowledge, (b) performance, and (c) consequences./87

Knowledge competencies first of all include "knowledge of subject matter." Teachers must have a firm grasp of the subject matter they are intending to teach. In addition, teacher educators might specify that teachers know the categories of Bloom's taxonomy; that they can describe various learning theories and how they apply to specific situations; or that they can define the attributes of effective classroom management procedures.

Performance competencies are those that define operations that a teacher might demonstrate in a real classroom or in a simulated situation. Can they operate a movie projector? Can they implement the Taba teaching strategies? Can they ask higher-level questions in the classrooms?

Students can demonstrate their attainment of these and similar prescribed behaviors by acting them out in peer teaching situations; by employing the behaviors in a micro-teaching format that is recorded by a videotape camera for later analysis; or by performing them in student teaching assignments.

Consequence competencies are those that are reflected in the accomplishments of the teacher's pupils. Teachers are asked to demonstrate that they can effectively bring a group of youngsters up to a specified level of proficiency in reciting the multiplication facts. They are asked to show that they are able to teach pupils how to use an atlas in specific ways within a given range of accuracy. In these tasks, teachers are not limited to the methods they use; the acid test is whether or not the objectives which they have been assigned are met as determined by the behaviors of their pupils.

For the most part, the competency-based approach is utilized in the core of experiences most often termed "methods courses". Generally, those courses are dropped as the competency-based program is introduced. In their place are substituted lists of objectives that a student is to pursue according to his own time-table. Faculty members are available to help students on a one-to-one basis as they undertake the suggested activities which lead to the attainment of the objective. In one midwestern university, a large room is set aside for faculty and students to meet. Students wait patiently as though they were patients in a physician's reception room until a professor is free to discuss the work. Once a student senses that he has acquired the objective, he can then visit an examination room. This facility is usually staffed by a clerk who upon inquiry selects the appropriate examination corresponding to the objective pursued by the student. The student takes the examination to a seat in the room and privately completes the examination. The clerk then grades the paper. (Almost always, the competencies in this program are assessed by objective multiple-choice tests or fill-in-the-blank items.) The clerk then prepares a computer punch card upon which is entered the student's name, the date, the form of the examination taken, the competency that was assessed, and the student's score. Once a week the accumulated computer cards are fed into a computer. The print-out, addressed to students and professors, indicates to both which objectives have been met during the previous week and which ones are most appropriate for attack next. If a student were clever enough, he might complete all of the objectives in one week. However, it would be very unusual for a student to finish so quickly. One program we visited had over sixty objectives with more than half of them specifically required of students.

Certainly it would take more than a week for an accomplished teacher merely to take that many achievement tests.

To further illustrate the kinds of performances required of students in competency-based programs in the United States, we have compiled the following list. The behaviors included in the list may not be representative of all of those found in current programs; nevertheless, in our view, they do suggest the general spirit of the most popular programs.

> ... to be able to change tasks in class, modifying planned pupil tasks to fit readiness level of individuals.[9]
>
> ... to be able to motivate pupil's attending behaviors, providing variety, pleasure, decision, concern and respect, challenge, advanced organizers, successful trials.[10]
>
> ... to be able to explain subject matter to pupils, interpreting terms, meanings, and motives in language that readily communicates to the pupils.[11]
>
> ... to be able to acknowledge pupil contributions by responding to answers and suggestions.[12]
>
> ... to bring relevant psychological principles to bear in confronting problems of deviant behavior.[13]
>
> ... to be able to operate audio-visual equipment, including setting-up, running, repairing, automated instructional equipment.[14]
>
> ... identify in his own written reports on children's behavior and the reports of others those portions which are inferences or evaluations.[15]
>
> ... describe the characteristics of a small number of broad categories of teacher behaviors in classrooms, and the probable intentions of teachers at the time they exhibit each type of behavior.[16]
>
> ... when told to produce an example of one of the three categories of teacher behavior (management or administrative, personal or social, instructional or "teaching"), the student will be able to observe a short segment of interaction between a teacher and a pupil, and when the presentation is interrupted, will produce an example of the requested behavior in either written or oral form.[17]
>
> ... write and justify the appropriateness of statements concerning the affective outcomes of lessons and curricula.[18]
>
> ... translate lesson plans for specified children and subject materials into teaching strategies.[19]

Another characteristic of the competency-based teacher education movement is the micro-teaching unit. Students in these programs are asked to engage in peer teaching or in instructing small groups of pupils for a brief period of time. Beforehand, students are told that their teaching will be rated on several specific competencies, such as asking higher-level questions, providing appropriate reinforcement, being enthusiastic, and many others. In some programs, the techniques teachers make use of are not examined as much as the learning that takes place in the "students" participating in the micro-teaching. For example, if the objective of the session were to teach children the quadratic formula so that all of them could at the end of the lesson write it down from memory, then the teacher will be deemed a success to the extent his students are able to reproduce the formula after the teaching session. It is rare, however, for a program to examine solely the results of teaching; almost all make use of both the processes and the outcome measures. Students who are rated low for their performances in the micro-teaching experiences have ample opportunity for re-teaching to demonstrate that they have improved.

Once a student has completed all of the required competencies at the level deemed appropriate by the faculty, he then enters the last phase of his program - student teaching. Almost always, the student teaching experience is not different from that found in any of the other programs we visited. A student is assigned to a teacher for a period of time, and that teacher provides criticism to guide the intern's development. Some competency-based programs make an effort to apprise the cooperating teachers of the various objectives to which their students have been trained. It was not clear to us how effective this effort was in changing the perceptions and practices of cooperating teachers.

There is probably no other educational development in the United States that has elicited so much harsh and hostile criticism during the past ten years as has the competency-based teacher education movement. Several of these reactions are discussed in the following paragraphs.

The central attack, and the one that at the same time angers and dismays most advocates of competency-based teacher education, is that the approach is "inhumane." There are at least two explanations for the strong attack on competency-based approaches by "humanists" - the first basic and the second almost trivial. Most self-styled humanists part ways with those who are interested in the competency-based programs on the issue of the metaphor used to describe the basic purposes of education. The competency-based teacher education advocates tend to use an industrial metaphor. They speak of concepts such as input and output, the creation of products, and so on. Humanists are repelled by such a conception of the educational process. Most of the latter favor a "growth and development" metaphor which leads to the planning of educational programs by the identification of experiences that students will undergo. The humanists believe that from experiences that can be called "educative", many different worthwhile ends can emerge - on the whole unpredictable by either the teacher or the pupil. Therefore, there is little room in education, as defined by this group, for prespecified goals.

Many humanists see the imposition of goals upon students as counter to the best interests of teachers or students. Their position is buttressed by the inability of the advocates of competency-based teacher education to provide empirical support for the goals that they impose on their students. For instance, as far as is known, there is no evidence that knowing the categories found in Bloom's taxonomy contributes to the efficiency of the teacher's performance, even when measured on the grounds advocated by the adherents to the competency-based approach. (Needless to say, the humanists would probably reject the evidence if it did exist since they deny that success in imposing goals onto students, and then demonstrating that the students acquired those goals, is relevant to being a good teacher.) Therefore, it is the basic premise of the competency approach - that the identification of instructional goals is the initial step in the process - to which humanists take issue.

A second and perhaps minor matter that contributes to the "inhumane" image that seems to cling to the advocates of the competency-based teacher programs is the computer. Computerization of information is seen by many people in the United States as a threat to their privacy. As universities utilize computers to facilitate grading, registrations, and communications within the bureaucratic organizations, the effects are seen as de-humanizing the entire educative process. People in general and students in particular are averse to being treated as a number.

There are many distressing examples highlighted in popular media that attest to how lives have been ruined, or at least inconvenienced, by computer error that probably would have been avoided by a person-to-person contact. Because of the tremendous need to keep track of the independent progress made by students as they wend their way through the various tracks of a competency-based program, several institutions have instituted computer programs to meet this need. (In one institution the computer program is referred to, perhaps unfortunately, as a "surveillance system.") Associating competency-based teacher education with the use of computers has apparently emboldened the opponents of this movement to tag it with an "inhumane" label.

In preparing this report, we visited the University of Houston to observe their competency-based program. It was during our visit to this site that we became aware of the dismay of competency-based teacher educators over the humanists' attack on their efforts. Again and again we were told by the Houston faculty, "My job is not to focus on competencies; it's to focus on people." It was our judgment that indeed the Houston teacher education was as much "concern-based teacher education" as it was "competency-based." Several attributes of the Houston program seemed to temper what might indeed be an inhumane approach to students. First, students are generally working in schools every day of the week. The opportunity to work in schools with teachers and pupils apparently enhances the feelings of involvement on the part of students in this program. Second, students are normally assigned to a team of professors for the duration of their training program. Over a two-year period, warm and personal relationships are developed through the medium of personal and informal contacts between students and professors. Third, a factor that may contribute to a more congenial atmosphere from both the students and the faculty's vantage point is an apparent agreement on the part of all concerned about what is considered important in teaching. There appears to be a sharing of technical vocabulary and a consensus about program priorities that pervades the Houston effort and that suggests a unity of concerns among faculty and students that is quite unusual in most teacher education programs. Borrowing in the main the ideas advanced several years ago at the Stanford University teacher education programs, the professors and students at Houston use the terms "set induction", "indirect teaching", "non-verbal communication", "divergent questioning", and others with a precision and with a frequency that may in fact be reassuring to all involved. Fourth, the professors at Houston gave the impression to us of being deeply committed to the success of the program. To an extent that seemed somewhat to concern the college administrators, the faculty at Houston spend a great deal of time with their undergraduate students in schools holding informal conferences, reviewing video tapes of their teachings, and sitting in on conferences between the students and their cooperating teachers. Again, such commitment appears conducive to the establishment of a supportive climate for everyone involved in the program.

A final characteristic of the Houston program that can be reflected in a number of other competency-based programs in the United States and that may ameliorate the potential for inhumaneness is the following. While the advocates of competency-based programs have argued that objectives must be stated with high-order specificity, almost none of the objectives we reviewed at Houston or that we found in the literature meet the criteria outlined by Mager.[20] Almost all of them omit that aspect of the objective that delineates the performance standard a student must meet to provide evidence of acquisition of the competency. It appeared to be the practice to review the performance displayed by a student as evidence of his competency in a certain area and to adjudge it a success. Often, in a private conference, students are told of their weaknesses and informed of ways to improve the performance, but it seemed to us to be a rare occasion that would result in a student's failing. As a matter of fact, there is apparently no sharp difference in the failure rate at Houston now that a competency-based approach is used throughout the College compared to failure rates several years ago. (This is not the case in a number of other locations; at other institutions the number of students entering the program and not completing the requirements has risen dramatically.)

Our observations gave credence to the claim made by the faculty at Houston that a competency-based teacher education program is not incompatible with humane treatment of students. There remain, nevertheless, profound disagreements within the teacher education profession in the United States about the appropriate metaphors that are suitable for describing the educational process.

C. Promoting Self-Development

A school of thought about teacher education that is struggling to survive the current impetus toward competency-based teacher education is that exemplified by the work of Arthur Combs at the University of Florida. Combs and his many talented colleagues are working in a teacher education program which stresses the importance of the "self" of the teacher. This program, termed "humanistic" by its advocates, is philosophically rooted in the progressive education movement of the 1930's. Overshadowed during World War II by an urgency to mobilize all American institutions (including schools) to win the war, the progressive point of view is now regaining visibility and respectability because in part of its new base in phenomenological psychology, because of world-wide acceptance of its assumptions centering on the primacy of the individual, and because of the empirical support researchers have been able to accrue. Combs objects most in the competency-based approach to the ready acceptance of the "industry" metaphor in education. He argues that if industries were organized to benefit the worker, then industry itself would reject "systems" approaches. In his eyes, teaching is a "helping profession". As such, the client occupies the central position in the interaction between the helper and the client. It is the client who knows what he is feeling, what he would like to know, what his goals are, and what meanings certain experiences provide for him.

More explicitly, the teacher education program at the University of Florida is based on the following principles.[21]

- "People do only what they would rather do. That is, people behave according to choices they make from among alternatives they see available to them at the moment.
- Learning has two aspects: (a) acquiring new information and (b) discovering the personal meaning of that information.
- It is more appropriate for people to learn a few concepts rather than many facts.
- Learning is much more efficient if the learner first feels a need to know that which is to be learned.
- No one specific item of information and no specific skill is essential for effective teaching.
- People learn more easily and rapidly if they help make the important decisions about their learning.
- People learn and grow more quickly if they aren't afraid to make mistakes.
- Objectivity is not a valuable asset for a teacher. What is needed instead is concern for students.
- Teachers teach the way they have been taught--not the way they have been taught to teach.
- Pressure on students produces negative behaviors such as cheating, avoidance, fearfulness, etc.
- Teachers are more effective as their mental health improves thus freeing creativity, self-motivation, and concern for others."

Students entering into this innovative program participate in three distinct program components - the seminar, the substantive panel, and the field experience.

The most distinctive aspects of the program are found mainly in the seminars. A group of thirty students is assigned to a single professor for the duration of the two-year sequence of professional education. The students range from beginners to those who are just about to graduate. As students complete the program, replacements are added to the group. The thirty students are divided into two sub-groups for discussion purposes. The discussion groups meet two hours a week - often in informal settings such as faculty homes or in students' rooms. To enhance group cohesiveness, all thirty students also meet together once a week and gather together informally on other occasions during the term. The seminar is the place where, through discussion and exploration, the students discover the personal meaning of the learnings and experiences they are acquiring in other phases of the program. Individual records are maintained on each student in the seminar. The records include diaries kept by the students describing their experiences and activities in the program and evaluations of their progress by members of the teacher education faculty. The instructor of the seminar also distributes a weekly newsletter.

While seminar instructors vary in their approaches, all attempt to focus the students on their own self-development. Some use "standard" exercises that are derivative from the "human potential" movement. Examples include role-playing exercises and group problem-solving tasks. Students are asked to take strong positions on various issues and share with others their understandings of the origins of their beliefs. Other instructors do not introduce such procedures but merely invite students to share their experiences. As topics are introduced in this informal setting, the instructors engage students in a search for personal meanings.

A second component of the University of Florida program is the substantive panel. This panel is made up of faculty members who usually teach methods, curriculum, and foundation courses. Instead of convening classes, however, panel members prepare and distribute a list of learning activities that students are to complete. Included in the list are some activities required of all students, but a large number are optional, and students are encouraged to propose their own activities if they feel a substitute is desirable. The first required activity is to attend an orientation session in which the entire package of activities for a given area is introduced. (The areas included science, mathematics, social studies, reading, language arts, sociological foundations, psychological foundations and curriculum.)

In the literature describing the Florida program and in the materials the students receive, the activities are at times listed under the rubric of competencies. Examples of competencies in the social studies list include the following[22]:

"- To differentiate among at least three major social
science disciplines:
a. the essence of each discipline (or a definition of
the discipline);

b. the major concepts and generalizations;

c. the processes used for discovering and building knowledge within each discipline;

d. examples of materials and involving teaching activities to use with children.

- To locate, evaluate, and develop skills in using broad range of media and activities to promote children's learning in the social studies.
- To recognize the variety and range of the skills pertinent to the social studies; to develop teacher competence for helping children to gain these skills.
- To develop, describe and evaluate social studies programs for children in elementary school years.
- To recognize personal-social and intergroup problems children face in their everyday lives and to assist in the use of the cognitive and affective processes in problem solving situations.
- To demonstrate that a student can plan and carry out a group study with children using inquiry or problem solving processes."

In the social studies area, students must acquire all six of the competencies listed. They are provided with an array of suggestions for fulfilling the competency requirements. The activities include attendance at a series of laboratory sessions, reading a collection of books and writing reaction papers addressed to the intent of the competency statement, developing an instructional package on a social studies concept, writing a critique of a commercial social studies program, and participating with peers in the selection and investigation of a problem. (This list is included to convey a sense of the activities found in the social studies package; there are many more, and those included are addressed to several of the competencies listed above.)

Students are expected to do extra work ("beyond the minimum") in three subject areas under the purview of the substantive panel. In those three areas, selected by the student, panel members prescribe additional work assignments from which students can select the ones they wish to pursue.

The package of activities in the program directed toward the area of curriculum eschews the use of the word "competency". In this collection, eight activities are required of the student, with the opportunity to choose from sixteen.[23] All students are asked to complete six specified activities; no choice is permitted here. However, they may select the two remaining needed to fulfill the requirement by electing them from seven others delineated by the instructor. The culminating activity for the curriculum area is a conference with the instructor to discuss the student's work. In carrying out the assignments, students have a number of other choices to make. A student may do fewer assignments, but expect the professor to employ higher standards in judging the acceptability of the work. Another alternative available to a student is to carry out some independent work under the professor's supervision resulting in at least three "substantial" term papers.

Student progress in the areas directed by the substantive panel is carefully recorded on appropriate forms and filed with the seminar leader. It is the responsibility of the seminar instructor to help students understand the progress they are making and the strengths and weaknesses they are demonstrating as they advance through the teacher education program.

A third component of the Florida teacher education program is the field experience to which students are assigned. Field experience is a continuous part of the program, with students actively engaged in some responsible roles in schools during each quarter of the program. Students are assigned to explicitly defined roles in the field depending on their maturity and previous experience. The role definitions are meant to serve as guidelines for students and instructors and not as narrow prescriptions. Nonetheless, they do provide those involved in the program, students, cooperating teachers, and others, with expectancies to guide their work. The levels of involvement include the following[24]:

- Tutor: As the initial point of entry, students are expected to help children on a one-to-one basis; to become familiar with classroom procedures; and to develop positive relationships with one or more children. Students in this phase of their school experiences are not to make lesson plans.
- Teacher-initiate: The second experience asks students to help children one-to-one; help the teacher with classroom chores; help supervise small groups according to the teacher's plans; and to improve human relations skills. Again, students at this level are not expected to prepare lesson plans.
- Teacher-assistant: At this level, the student is expected to carry out those tasks suggested under the teacher-initiate heading and also to evaluate the work of children and to plan and implement lessons delivered to small groups of children. The student is also asked to participate in the evaluation of his work in these efforts.

- Teacher-Associate: In this assignment, the student plans and implements a sequential series of lessons to classroom size groups of children. One central thrust of this assignment is for the student to develop a positive and productive classroom climate.
- Intensive Teaching: In this final stage of the field experiences, the student is expected to take on the role of the teacher in all of its aspects. These expectations include attending faculty meetings and holding parent-teacher conferences.

As found in the other segments of the program, the evaluation of the students' progress in field experiences is recorded on appropriate forms and filed with the seminar leader. These evaluations are collated with others generated by the students' efforts and used in the seminars to help students perceive more accurately the progress they are making.

The teacher education program at the University of Florida is characterized by systematic and continuous evaluation procedures. Deficiencies noted upon the student's entrance to the program are taken into account in program planning. Midway through the program, the data collected by the seminar leader in the form of judgments formulated by members of the substantive panel and by supervisors of the field experiences are considered when making plans for the future. A final evaluation takes place just prior to graduation. At this time, the student's entire progress is reviewed, taking into account all the evidence available. Sharing in the evaluation are the seminar leader, several members of the substantive panel, and the student himself. On the basis of this evaluation, final recommendations are written which may or may not lead to certification, recommendation for employment, and/or graduation. In the evaluation process, the grading symbols A, B, C, D, E are not used. If a student's work is judged to be less than adequate, instead of indicating so by the assignment of a low grade thus closing the matter off from further study, the student is asked to repeat the assignment until high quality results are produced.

The principal aspect of the Florida program that sets it aside from others found in the United States is the attempt to help students find personal meaning in their experiences through the medium of the seminars. The procedures used to help students acquire a sense of their own beliefs, apprising of the feelings and purposes of others, and a developing concern for self-renewal through self-initiated learnings are difficult to describe and even more difficult to evaluate. Nevertheless, the importance of these qualities is continually stressed. As Combs puts it, "We can't set aside the laws of learning because it is inconvenient to take them into account."

D. Cooperating with the Field

Cooperative Education, a movement that was initiated in the United States approximately seventy years ago, is based on at least two observations[24]:

"1. Every profession has many facets which cannot be taught in the classroom. These facets can be learned only through direct on-the-job experiences with professionals already successful in the field.

2. Most students find it necessary to work on a part-time basis and during vacation periods to earn the money to pay for their education. In almost every case, these part-time jobs have no relationship to the student's ultimate career choice, and therefore do not contribute to the professional education of the student."

Educators working in the cooperative education programs attempt to formulate programs based on these observations. The phrase "cooperative education" has been used to characterize these programs since they reflect the cooperation of agencies outside the university in assisting educators on campus to plan and implement programs of inter-related content and experiences. A key aspect of the cooperative program is the placement of students in field assignments that (1) are related to the student's career objectives and (2) are remunerative financially.[25] This last point needs special emphasis. While the rhetoric of higher education has for many years highlighted opportunities for all Americans to enter into professional careers, the fact is that there is a stern financial test blocking the door to most professions. The Cooperative Education movement is dedicated to the idea that higher education should not be an avenue only for the wealthy, and it provides access to the professions for the lower middle classes in the United States.

Advocates of the cooperative program in education contend that it represents a program based on a reality that is often missing in other types of programs.[26] First there is the reality of exposure to the pressures found in schools over a period of time; issues come and go and many professors locked in campus offices fail to account for them in their teaching. Students working in the schools in various positions confront them in a timely manner and the "curriculum" of the program necessarily is kept relevant by its cooperative nature.

A second realism factor that students meet early in their professional lives is the inequality and inequity of pay rates across the economy. Students learn first-hand that salaries vary with the supply and demand in a particular field. Prospective kindergarten teachers, competing against a surplus of workers available for jobs below the certified teacher level, may face different kinds of opportunities and different levels of remuneration than others working in some areas of science, mathematics, or computer science. This repeated first-hand experience with the world of employers affords students a chance to change their career plans early enough in their college program so as not to waste their time and resources.

We chose to visit Northeastern University in Boston, Massachusetts to learn more about cooperative education. All cooperative programs leading to the bachelor's degree at Northeastern University are five years in length. The student receives the same academic content for his degree as the regular four-year student receives in a conventional program. The work experience of the cooperative program is added to the academic content without replacing any of it.

As a rule, upon entering the program, students confer with specially-trained coordinators to identify the kinds of cooperative assignments that would best suit their needs. Approximately 35 per cent of the education students majoring in "non-science" areas and 20 per cent of the science majors are placed with public school systems in paid positions prior to practice teaching in senior year. The students on these job assignments serve as teacher aides and perform such duties as assisting regular teachers, supervising remedial and other special study groups, and monitoring lunch rooms and recreational periods. It is felt that such experiences give students more substantial backgrounds in the field of education than normally provided by just the practice teaching period.

It has been the trend for initial placements in the program to be with non-school but in people-oriented work. Examples of the non-education placements include: clerical worker, librarian's assistant, teller in a bank, prison guard, rehabilitation aide, laboratory technician, museum worker, and many others.[27] There are efforts to place students within the program to provide for progressive increases in the responsibility required of the student in the assignment he receives each year, and also to provide opportunities for students to make some choices about the assignments they elect.

The school year of twelve months is divided for administrative purposes into four quarters. Freshmen attend classes on campus for the first three quarters and then take a three-month vacation -- the only vacation available to students during the remainder of their college career. Students return as sophomores to work for a three-month period, return to class for three months, and accept another work assignment for three months. The sophomore year closes with a second three-month session on campus in classes. This pattern is repeated during the middle year (the third year) and the junior year.

In the last year of a program, student teaching at Northeastern University is carried out in a pattern that is quite traditional in the United States. A student is assigned to a master teacher in a school system for a specified period of time. The cooperating teacher is responsible for assisting the student in his development as a professional. Academic credit is assigned to this work (unlike the cooperative work assignments). The student does not receive pay for his efforts in student teaching and frequently must pay a tuition charge to the University.

As educational movements come and go across the educational scene in the United States, the Cooperative Education movement remains distinctive because of its distinguished history. The cooperative education idea was first developed at the University of Cincinnati in 1906. Now the movement has spread through quite a number of institutions including Drexel Institute, University of Detroit, Antioch College, Georgia Institute of Technology, University of Tennessee, University of South Florida, and many others. In 1962, a National Commission for Cooperative Education was formed for the purpose of expanding cooperative education in the United States. In spite of its rich past, however, cooperative education is for the most part overlooked in the current teacher education research literature -- an undeserved fate, and, in the view of the authors of this report, to the detriment of the teacher education enterprise.

E. The "Traditional" Teacher Education Program

To place the trends and innovations included in this report in some perspective, a traditional program in the United States is described in the following paragraphs. Of course, there is no such thing as a typical program. Nonetheless, the qualities of teacher education programs, especially at large prestigious universities, seem to have sufficient commonalities to be discussed in a general way.

The programs at the larger universities seem to offer the following experiences. First, students are enrolled in courses dealing with the philosophy of education and with theories of learning. These courses are generally followed by a field experience in schools. During this initial field assignment, students rarely undertake major responsibilities. They might observe, prepare materials, grade papers, or tutor one or two children who are falling behind. Once this initial experience is completed, students elect the required methods courses. The number of courses required in this category varies considerably. Almost all programs require a methods course in reading and in mathematics. Others might require a methods course in science, or language arts, or music, or art, or in all of these areas. After finishing these requirements, students then enter practice teaching. Almost always, students are assigned to a single cooperating teacher for a period from six to sixteen weeks.

As far as we could determine, there are no empirical bases for the differences in the length of the student-teaching period. The differences are apparently due to tradition, convenience, and public school preferences. During the internship period, student teachers are usually supervised by graduate assistants an average of three times. Concurrently, seminars are held on campus with the graduate assistants as seminar leaders to share problems and perceptions.

The primary characteristic of these programs is that they lack clarity and distinctiveness. Very few of them have explicit assumptions or definitive goals that guide the faculty who teach in them. The program can be seen as an entity possessing ever-changing components. Instructors are invited to teach in the program to fill out a full teaching assignment. Almost exclusively, professors at large and prestigious universities are hired because of their particular interests or skills in conducting or directing research projects. It is rarely the case that a vacancy in a faculty is used primarily to meet the instructional needs of undergraduate programs.

Scholars at these universities might accept an assignment to instruct undergraduates for a semester or two, and when a research grant is received, the assignment will be passed along to an individual whose research grant has just ended. There are very few efforts to orient newcomers to the purposes of the program or the assumptions upon which the program is based. Rather, it is generally assumed that the scholar will do his best, that his best while different from persons who have taught before him, is nonetheless useful. Students pass from course to course, hearing diverse views, and usually detecting overlap in lectures and assignments. Because of the large numbers of students in these programs, and the very few resources allocated to teacher education at the major research-oriented universities, very rarely do students have the opportunity to sort out the bewildering ideologies they confront by meeting individually with faculty members, or even in small groups.

A second notable quality of traditional programs is the segmentation of the program. Subject matter content is taught in one course while subject matter methods are introduced in another. The opportunities to practice the methods covered in the curriculum are supervised in yet another course. Within this sequence, it is possible for a student to meet several points of view, some diametrically opposed, as he passes through the program.

Associated with the segmentation is the apparent conviction that the closer one gets to "practice" as an instructor and the further he is removed from "content", the more pedestrian his work becomes. In institutions which reward scholarly work with raises, promotions, and eventually tenure, most ambitious faculty shy away from practice courses. It is not uncommon to find all the practice courses taught by transient graduate students who are supporting their studies by accepting this task. Adding to the problem, it is possible that the graduate students are not even majoring in teacher education, but rather in other fields such as psychology, administration, or philosophy. It is very unlikely that graduate students are aware of the methods stressed in the methods courses or even the views of cooperating teachers in local schools. They are rarely involved in the program long enough to find out, even when they are interested.

A third factor that is quite common to traditional programs is the division of methods instruction into curricular areas. Courses are taught in math methods, reading methods, science methods, etc. (The apparent need for such content-related experiences was apparently felt in the innovative programs we observed leading for instance to the "Methods Potpourri" arrangement at the University of Massachusetts.) With professors only on rare occasions sharing their views on methods with one another, it is possible for a student to learn how to teach mathematics using a token reinforcement system, to learn how to teach reading through a diagnosis-remediation cycle, and to teach language arts in an open classroom organization.

What clearly differentiates the training of young men and women at these institutions is the quality of the liberal education they receive. Unlike the normal schools of thirty years ago, and to an extent unlike the institutions that have not yet been able to attract large numbers of leading scholars, the large prestigious universities have many top ranking researchers on their faculties who in turn attract the most able graduate assistants. While scholarship alone is not a guarantee of excellent teaching, it is a fact that as professors are dealing with profound issues in their own work, they tend to pass on their excitement and fervor to their students -- even in large lectures. The prestige of a university also attracts bright undergraduates. While student openings do exist in some mediocre institutions of higher learning, the competition for admission to the prestigious universities is keen. As a result, the hidden curriculum found in all schools and colleges -- the after class discussions, the dormitory exchanges, and other similar interactions are enriched by the very quality of those taking part. All of these influences seem to contribute to the high quality of the total educational experience at prestigious universities.

Employment figures suggest that graduates of the highly prestigious universities seem to have a better chance of securing an initial position than their counterparts who are graduating from programs that are more rational, more organized, and more carefully staffed with persons dedicated to teacher education *per se*. Whether this is the case because principals and other prospective employers are impressed with the inherent intelligence of these graduates or for some other reason is difficult to determine.

For all of the disarray, such programs have their defenders. First, large prestigious universities tend to attract very able high school graduates. In addition, the calibre of the graduate students is likely to be very high. Thus, while direct interest in undergraduate programs might be missing, the programs are probably conducted by the brightest scholars in the United States. Also, it is very likely the case that the teacher education graduates of these institutions have received the best liberal education in classical terms that is available in the United States today.

Despite the sometimes casual nature of the preparation program, the young and inexperienced aspirants who enter this program are frequently transformed into accomplished professionals. The seeming paradox is probably attributable to the selection factors; but it is a paradox deserving of more intensive examination.

F. Reexamining In-service Education

The primary focus of this study has been on the pre-service patterns found in the United States. In this section some noteworthy trends in in-service education are described.

With the expansion of public schools almost at a standstill in the United States, and with fewer new teachers entering the profession than was the case in the 1960's, teacher educators are shifting their efforts toward in-service education. Generally the same ideological issues that characterize the pre-service level are reflected in in-service teacher education. Some teacher educators strive to assist teachers to grow and develop by instructing them in well-defined skills. Others promote independence and confidence in the teacher through programs that are often more therapeutic than overtly educative in the conventional sense. In the following paragraphs these two approaches are elaborated.

a. Skill-Building Approaches

The research and development centers in the United States (Federally funded) that focus on teacher education have tended to accept the "skills" orientation. Most notable in this area is the Far West Laboratory for Educational Research and Development in San Francisco. One approach of this laboratory has been the development of minicourses. Authors of minicourses identify concrete, practical skills that teachers can acquire directly through practice and immediate feedback. Teachers enrolled in minicourses watch a filmed demonstration of the skills, practice using them by teaching a short lesson to a small number of students, and videotape their performance for purposes of evaluation. The Far West Laboratory leadership claims that this immediate and objective feedback, enabling teachers to make needed corrections on their own, has proved effective[28]. (It should be noted that minicourses are deemed appropriate also for use in pre-service education).

Minicourse I of the Far West Laboratory is designed to improve the questioning techniques of teachers[29]. The first sequence instructs teachers to ask a question, to pause at least five seconds, and then to call upon a student for a response. Teachers are urged to be accepting of student responses and to call upon both volunteers and non-volunteers to keep students alert. The second sequence in the minicourse demonstrates how teachers can ask questions that require longer pupil responses. Teachers are shown how to ask questions that require students to use higher cognitive processes, and how to redirect the same question to a number of different students to decrease the amount of teacher participation and increase pupil involvement in the discussion. A third sequence in this minicourse is designed to improve the "probing" techniques of teachers. Teachers are shown how to prompt students, how to clarify students' views, and how to refocus student responses. The final sequence demonstrates teacher behaviors that might impede the flow of discussion in a class. Such behaviors as repeating the questions and/or repeating students answers are demonstrated to illustrate the deleterious effects they have on the pattern of discussion in the classroom.

A second minicourse focuses on the development of children's oral language skills. The first sequence introduces the skills that expand language and thought. The second sequence demonstrates how teachers can model new language patterns, elicit the use of language on the part of children, and provide specific praise for proper use of language. The final sequences of the minicourse apply these skills in teaching specific language skills: positional language in context and in conjunction with objects; language for classifying and describing objects; and language for describing and identifying action[30].

Other available minicourses include those dealing with individualizing instruction in mathematics, organizing independent learning, and asking higher level questions. The first of these courses helps the elementary school teacher manage instruction on an individual basis. It outlines tutoring techniques to improve math skills through diagnosis, demonstration, and evaluation. The second helps teachers in primary schools to learn a set of organizational principles that make it possible for them to work with a small group of children for 15 to 30 minutes, while the remaining students carry on independent activities. The last in this set trains teachers in the intermediate grades to ask questions that lead students to make inferences, solve problems, and develop predictions.

One distinctive characteristic of these Far West Laboratory approaches, in contrast with the pre-service programs described in this report, is the emphasis placed on new technologies -- most notably video-tape. The pre-service programs are notable, in fact, for the absence of computers, television, and even film. This emphasis on technology in the development of the Far West Lab materials does have a serious limitation, however. The minicourses are expensive. It could cost a school district $1,575 to purchase the films associated with Minicourse I and more than $200 to rent the films for a six-week period. Since it might be possible to identify up to 200 "skills" that are important to teachers, such an approach is costly and only committed individuals with higher-than-average available resources are likely to invest funds in this approach.

A second approach to skill-building has focused more on the development of appropriate understandings on the part of teachers than on performance skills such as those emphasized at the Far West Laboratory. The National Center for Improvement of Educational Systems of the U.S. Office of Education has invested funds in materials that assist teachers in developing understandings about learning[31]. Such understandings are taught through the use of cognitive materials prepared by this project which describe segments of behavior categorized for the purpose of teaching (a) concepts and principles used in interpreting children's behavior, (b) knowledge about knowledge, and (c) self-understanding. The behaviors displayed in the protocol materials are illustrated by episodes that exemplify the concept that is being portrayed. The behaviors are presented to teachers through various media -- print, visual, and/or audio-visual.

For example, students are shown film clips of teachers properly "reinforcing" a student's response. They are also shown film clips wherein the teacher's response is not appropriate. Often, the developers insert "cues" in the film to prompt the viewers to observe examples of reinforcement. Similar materials are used in an assessment mode without the cues. Viewers are asked in this instance to view the film clip and to identify instances in which reinforcement took place or instances in which it might appropriately have taken place.

The concepts exemplified in the materials developed by this project meet two criteria; they are critical to instruction, and they contain an element of universality such that the materials developed will be useful at several different levels of instruction. Pilot projects to test the feasibility of this approach were funded initially in 1971. The following partial list demonstrates the range of areas that are being studied[32].

- Protocol Materials in Reading --
  Bucknell University
- Protocol Materials in Learner Outcomes --
  Oregon State System of Higher Education
- Protocol Materials in Oral Language Development --
  Ohio State University
- Protocol Materials in Model Learning, Respondent Learning,
  Reinforcement, Operant Learning, and Shaping --
  Michigan State University
- Protocol Materials in Teaching Concepts, Teaching Interpreting, and Teaching Particulars -- Washington University
- Protocol Materials in Relationships Between Learning
  Behavior and Conceptual Demands of Subject --
  Harvard University
- Protocol Materials in Cognitive and Affective Interaction and Classroom Management --
  Indiana University

A third type of skill-building, in-service activity prominent in the United States is associated with particular curriculum packages and/or programs. For example, Science Research Associates, a publishing company, distributes an early reading program called DISTAR. School systems that adopt this particular program may also contract for in-service education services from the publisher. Since it is often the case that DISTAR materials are used primarily by poor children within a district, and federal funds therefore are earmarked for certain programs in these districts, supplemental funds to purchase in-service training services are available. The publishers, Science Research Associates in this particular case, in turn employ psychologists, teacher educators, and others familiar with the program to train the teachers in special workshops.

The training is usually intense and systematic since the success of the materials is directly related to the degree to which the teachers implement the procedures precisely as intended by the authors. The DISTAR program carefully prescribes how children are to be diagnosed, how teachers are to deal with errors made by children during a lesson, and what remedial actions should be employed. Schools may commission, in addition to the training services, consultants who will assess the extent to which teachers are implementing the procedures correctly.

The basic assumption of such an effort is that teachers do not teach mathematics, English, science, or reading independently of available materials. Rather they teach these subjects using certain programs which have been selected from among many possible programs. The best way to assist teachers, say the advocates of this approach, is to help them master the program they are going to teach. Programs with well-defined and often narrow goals are best suited to such an approach.

b. Teacher Development Approach

A particular strategy, called the Advisory, designed to individualize in-service education is being attempted in various parts of the United States. This approach entails expert consultants working with individual teachers to provide whatever assistance seems necessary. The Advisory provides help to teachers only if the help is requested; it addresses itself solely to the expressed needs and interests of individual teachers; and it usually provides assistance in the teacher's own classroom and not in seminars, meetings, or on college campuses. The key to the Advisory approach, obviously, is the special relationship that is established between the teacher and the advisor/33/.

Advisory services are made available to teachers through a number of different administrative arrangements[34]. Almost exclusively at first, advisories were funded through U.S. Government initiatives. Two separate projects in the "Follow Through" program (a federal effort to support the education of poor children in the early years of compulsory education, so named because it followed "Head Start", a special preschool educational program for the poor) made extensive use of advisories. In California, the High/Scope Follow Through Project used advisors as a way of installing new curricula and instructional methods. In a program sponsored by the Education Development Center in the Boston area, the advisory process was the central intervention under study. In both of these instances, however, persons acting in the advisory role were in fact supported by the Federal Government.

In other sections of the country, advisory services are delivered by persons employed directly by the school system. For example, Lillian Weber has developed such an arrangement in the New York City Public Schools. Advisory services have also been made available through graduate training efforts. At the University of Illinois, Bernard Spodek has worked with graduate students who were assigned advisory roles in elementary schools in the State. The University of North Dakota's Center for Teaching and Learning also offers opportunities for students to work in advisory roles.

In still another mode, professionals present themselves to school systems as "free-lance" advisors making their services available on a contractual basis. Devaney reports that such "outside advisors do not have to work as hard as resource teachers to keep independent of school administrators, and they are less likely to have their perceptions skewed by the personal relationships within a school"[35]. She points out, however, that free-lance advisors may have difficulty understanding in sufficient depth the ongoing problems in the school.

In a study of the teachers' perceptions of what a person does in the advisory role, the following kinds of behaviors were among those identified[36]: The advisor brings materials to class, helps work with children, helps in making materials, shows how to work with children, determines teacher's needs, points out next steps, gives reinforcement and praise, boosts morale, provides literature, explicates principles, asks questions to stimulate thought, helps the teacher become aware of her own progress, and encourages new priorities in values. Of course, the ways a particular Advisory works with a given teacher varies widely. Some examples of procedures as described by teachers are included here[37]:

"She'll come in the room -- look around -- and maybe discuss things with me for a few minutes. Then she'll sit down and work with some children, and she'll talk in a very loud voice so I can hear without having to stop what I'm doing. I literally learned how to talk and work with children in new ways listening to her."

"(The Advisor) ... goes in and starts fiddling around with something and have a group of kids interested -- and I wouldn't know enough to start fiddling around it in the first place. I feel he can add something that I can't to my classroom."

"Oh, yes, they come right in the room and work -- and when they're there, they usually do something I wouldn't have thought of -- and I try to jot it down so I can remember to do it later."

The Advisory approach is based on the assumption that the best way to bring about change in teachers in-service is through the establishment of close, long-term, and supportive relationships. Initial reports suggest the assumption is warranted, and that advisors are effective.

G. Developing Teacher Centers

Whether a particular program of in-service education is established to convey skills to practitioners, or whether it is intended to promote autonomy and a sense of growth, it is very likely in the early 1970's to be housed in a facility called a "teacher education center". Centers have proliferated in the United States over the past seven or eight years. At present, they exhibit many different patterns and serve several different objectives.

The first centers to become widely recognized in the United States were those that were established as transition agencies between pre-service and in-service education. Teacher educators on university campuses tried to avoid the usual pattern of merely assigning their students to teachers in the field more-or-less haphazardly. Rather, they established long-term arrangements with public schools by developing teacher education centers. Student teachers were assigned to centers that served a cluster of nearby schools. The public school system and the University shared in the support of center personnel, who organized and implemented both the pre-service and the in-service activities within the center. The initial in-service training efforts were directed at improving the supervisory skills of the cooperating teachers (those who worked with student teachers) so that they would become more effective themselves as teacher educators.

One of the first such arrangements was established jointly by the Montgomery County (Maryland) Public Schools and the University of Maryland. The goals of this program included [38]:

> " - to cooperatively design, implement, and evaluate model teacher education programs.
>
> - to integrate theory with practice, the on-campus with the off-campus, and the pre-service with the in-service.
>
> - to articulate the theoretical education faculty (college) with the clinical teacher education faculty (school) in such ways that they work together in teams at the same time, in the same place on common instructional and supervisory problems.
>
> - to bring together pre-service and in-service teacher education into one continuing program.
>
> - to individualize professional development -- for the pre-professionals as well as for the practicing professionals.
>
> - to develop a "corps" of associates in teacher education."

The key to the success of such a center is the ability of the center coordinator. His role is "to bring together in creative ways the personnel and material resources of the school system and the college in ways that will produce effective laboratory experience programs for the university students assigned to the center and reality-oriented in-service programs for the teachers"[39]. As the University established a number of centers in cooperation with several different school systems, the success of the plan varied with the characteristics of the persons who were employed in the coordinator role. During the first years of the centers at Maryland, it seemed that the center coordinators were the only persons who were able to grasp the entire picture of the pre-service to in-service continuum. Professors and practicing teachers contributed to the program in fragmented ways, with these individuals contributing a day here or an hour there in a fashion orchestrated by the coordinators. Since the coordinators were generally persons without doctorates and without the accompanying status, they often were unable to influence either the public school officials or those in the university to change programs or attitudes. However, as the years pass, there are signs that this situation is improving. Staff from both the university and the public schools are becoming more sanguine about the impact of the centers.

More recently, American educators, particularly practicing teachers, became aware of the British teacher centers. They were impressed with how the British centers seem to have been established to meet local needs as determined by teachers themselves. As a result, a large number of centers -- for teachers and by teachers -- have been established throughout the United States. In late 1972, a survey was undertaken by the editors of Scholastic Teacher to identify teacher centers in the United States[40]. Approximately 80 centers were listed in this survey, and they were located in almost every one of the fifty states.

Activities sponsored by centers created in this mode include establishing lending libraries of curriculum materials; offering workshops; providing work areas in which teachers can develop and share curriculum ideas; making available advisory services, holding discussions among parents, teachers, students and any others interested in the educative process; arranging for speakers to attend PTA meetings and faculty assemblies; and publishing occasional papers dealing with current thought in American education. Centers find financial support from a number of sources: foundation grants, funds from the U.S. Government, support from the public schools, monies provided by various institutions in exchange for services, and from modest tuition fees charged to students.

The National Education Association, the largest organized group of teachers in the United States, is launching a program of NEA-sponsored teacher centers by establishing ten initially in widely scattered parts of the country. The NEA, as indicated in Section I, intends to increase its influence in teacher education activities.

One teacher center is described briefly here to illustrate the breadth of activities offered by these institutions. The Greater Boston Teachers Center effects arrangements with schools, museums, shops, and studios in the Boston area to make facilities available to teachers after school hours[41]. The staff of the Center arranges for groups of teachers from many different school systems, both public and private, to meet in classes covering such topics as Room Arrangement for Various Activities; Building Furniture and Apparatus from Tri-wall; Music, Dance and Drama; Mathematics Materials for Elementary Grades; Environmental Studies; Human Values in the Classroom; Woodworking in the Classroom; Teaching Black History in Boston, and many others. Persons staffing these courses come from a variety of backgrounds including education, the arts, museum work, and other allied fields. The classes offered by the Center are on occasion recognized by teacher training institutions in the area, enabling students to receive graduate credit for work undertaken under the aegis of the Center. The courses are usually open to parents, administrators, teachers, graduate students and others interested in education.

The establishment of teacher centers -- for teachers and by teachers -- is just beginning to flourish in the United States, and it is as yet too early to determine just what form they will take or what effects they will have upon teachers, upon teaching, and upon graduate education over the next several decades.

III. IMPLICATIONS FOR POLICY ANALYSIS

Before outlining policy issues that seem to be suggested by this study of emerging teacher education trends in the United States, a brief summary of these trends and the social and political context in which they are embedded are offered to review the setting for the range of decisions that will or should be considered in the American teacher education enterprise in the remaining years of this decade.

A. The Social and Political Context

... American teacher education is moving in many directions at once. The prospective teacher, and presumably the prospective employer, has a wider range of choices in programs leading to teacher certification, even at a single institution. Diversity in ideology and in program design is the keynote.

... There is growing concern about and investment in continuing education of teachers. "Teacher centers" represent one significant trend in inservice teacher education.

... Governmental agencies are gradually becoming more influential in modifying teacher education programs, primarily because of management and planning techniques that are being established at universities and in the public schools under governmental pressure. This pressure is from legislatures, executive departments, and -- to a degree -- from the courts.

... Although there is no clear, single direction apparent in teacher education for the 1970's, performance-based teacher education programs represent by far the most visible distinctive development of the decade.

... The scientific base for teacher education and for education in public schools is primitive, but there is a growing desire in many quarters to base practices on the results of scientific findings, and attempts are being made to develop programs on the basis of research -- perhaps to a degree unwarranted by the present state of scholarship in the field.

... There is a tendency to move teacher preparation programs, both preservice and inservice, away from the campus and out to sites in public school districts.

... There is considerable effort to establish objectives of teacher education programs, partly as an aid in decision-making about support to be accorded these programs, and partly as an evaluation tool to judge their success.

... Teacher organizations are gradually becoming more influential in the design of teacher education programs as teacher groups grow in size and assertiveness.

... Within the governmental sphere, there is a drift of power from Washington to the individual states. The states have always been primary in education. Federal initiatives became strong only in the 1950's and 1960's. But the trends of the past decade or two are reversing.

... State governments are increasing their influence over teacher education, both by targeted budgetary decisions and by modifications in teacher certification requirements.

... There is less optimism about the tractability of social systems in the 1970's than there was in the 1960's. The educational system does not seem to respond to governmental initiatives as was hoped when legislation was passed, and as policy directives are administered by the executive departments.

As a broad conclusion, education generally, including the teacher education component, seems to be taken more seriously by government, by the public, and by professionals than was the case before Sputnik I. Until fifteen years ago, education in the United States was generally accepted as important, but to a major degree it was taken for granted. Children went to school. Teachers were prepared. While there were problems here and there, sometimes serious ones, the system was not questioned closely and aggressively by large numbers of people.

This condition has changed for several reasons. For one thing, political rhetoric about equality did not seem to make people equal. Blacks and the poor did not seem to enjoy the fruits of American Society as much as many other groups, and, it was asserted, primary responsibility for this state of affairs lay in our social and political policies. There were monumental attempts to use the schools as an instrument to advance social justice. And there was later monumental disappointment with the results.

While the equality aim was perhaps the strongest single theme of the 1960's in education, it followed a brief but frantic and influential period in which the schools were mobilized to improve the American defense posture. Sputnik I produced waves of distress and ripples of reform throughout the American educational system for the avowed purpose of catching up with and surpassing the Soviet Union in space and defense capability. (No political leader or popular commentator seems to have credited the schools with the fact that the United States did surpass the Soviet Union in space accomplishments, and in a very short period of time.) The brief flurry of attention to programs for better education of future scientists and engineers seems to have set the stage for systematic and continual use of the schools as an instrument in advancing general societal aims.

For a variety of reasons, some of which have been sketched in this report, the emerging model of a teacher, insofar as there is any single discernible trend in this regard in the United States, is toward the model of teacher as efficient and skillful manager. The schools are expected to become more business-like as well as purposeful. Efficiency, a goal orientation, and a consciousness of costs have been emphasized. Concomitantly there is new attention to the design of sophisticated instructional programs directed toward well-understood objectives.

The analogue to business and industry, always highly esteemed in the American culture, is clearer today than it was twenty years ago. Educational discourse is peppered with talk about products, inputs, outputs, and even throughputs. Flow charts are used in policy analysis and curriculum development as a planning device to identify critical decision points. American educators talk of systems, costs, benefits, and accountability. High order rationality is pressed aggressively in the competition for resources among the social programs. There is a continual quest for social indicators that would enable policy-makers to establish a series of benchmarks indicating expected and actual accomplishments.

At the same time, during the 60's, the schools also served as a battle-ground for competing community groups. In one of the more dramatic such developments (in New York City), considerable control for school policy-making was transferred to neighborhood groups and away from the City's centralized Board of Education. The schools were used as a base for the establishment of local political power. City politics for years swirled around issues of "community control".

Events such as these have emphasized that schools and teaching are indeed serious business. And partly because there is greater strain in the American social fabric than was the case twenty years ago, there is probably more strain evidenced in schools and among teachers now. Schools are often tension-laden institutions. General social malaise has not bypassed educational institutions, partly, some suspect, because schools in the 1950's and 1960's were expected to carry so much of the burden for correcting societal ills.

Against this background, emerging policy issues are far from crisp. In education we are not dealing with a field in which there are basic and broad agreements about fundamental principles, with the major task one of choosing from among clearly understood alternatives. Perhaps policy in some fields yields well to systematic analysis of the sort introduced in many governments in the 1960's, but the situation in education seems confounded by the fact that there are more than two million teachers in the United States who have been trained in thousands of separate teacher education institutions. They are employed by more than 17,000 separate governing units, each unit operating broadly within the statutory constraints of one of fifty different states. Occasionally the federal government takes major initiatives to modify this complex system, but with mixed and ambiguous results.

B. Some Policy Issues

a) One policy matter that received little attention on a nationwide basis is the question of recruitment for teacher education programs. When dollar allocations are examined, it is noted that there is an infinitesimal investment in recruitment compared to the investment in the education of teachers. Inasmuch as teacher attitudes are modified with great difficulty, a significant decision is made about the kind of individual who will be teaching in the schools four or five years hence at the moment that individual is admitted to a teacher education program.

Since attitudes and values of teachers play a critical role in the educational system, it is necessary to learn more about the attributes of individuals who choose to teach. Selection criteria of a more systematic sort than are used at present might be employed when admitting each teacher education student.

Alternatively, choices can be made about the particular institutions that are to be authorized to offer teacher education programs. It is known that different kinds of students attend different universities. The characteristics of the students at a particular institution in terms of intellectual attainment, intellectual aptitude, family income, and social class are well understood. Insofar as there is a relationship between these attributes and the qualities desired in a prospective teacher, this policy issue can be approached more analytically.

At the outset, however, it should be recognized that the topic raises political and social questions that are highly controversial, and perhaps for that reason they cannot and will not be broached by teacher certification boards and legislators. Nevertheless the issue is highlighted here because it may well be the one that has the most profound potential for influencing the educational system over the long term.

b) A second policy issue surrounds the relationship between the award of teaching credentials or a license and the requirements of the teaching position. At the moment in the United States, the prospective teacher is expected to present credentials that may have little relationship to performance on the job. For example, the teacher is expected to have attended university for four years and have completed a large number of courses that are not assumed to bear directly on teaching -- though presumably they are valued as a part of general education. It is alleged by some critics of teacher education programs that teacher education should be geared more closely to job requirements. The fact that it is not serves as a device to screen out certain applicants, rather than a device to preserve standards.

Advocates of performanced-based teacher education programs point out that PBTE directly addresses this issue. To the degree that employers and teacher educators feel successful in delineating the skills required for successful teaching, there likely will be related pressures to couple licensing directly to the acquisition of those competencies. The educational policy ramifications require careful scrutiny, particularly because a certain model of schooling is implied by such a move; this model should not go unexamined.

c) The American experience of recent years suggests a policy study associated with the demands for decision-making authority in teacher education by different groups. In the design of teacher education programs and formulation of teacher-education policy, what are appropriate roles for elected school boards, the public at large, the organized profession, the various legislatures, the executive branches of government, the established teacher education institutions, local school districts, and representatives of business and industry? Control of teacher education is in question of course. The competing groups are active. Inevitably decisions will be made as a result of the interplay of political forces. The final decisions, however, might be influenced by analysis of the practical and social implications of the roles suggested by and for the various parties. In fact some experimentation might be inaugurated to study the effects of planned change to test the competing approaches, possibly in combination.

d) A somewhat related policy question centers on identifying the scientific base for the establishment of teacher education arrangements or practices. It would be useful background for the policy decisions that must be made in teacher education to review in detail those elements associated with the education of teachers that have yielded or are likely to yield to research. If it can be demonstrated, for example, that student achievement is directly associated with definable teacher competencies, then a powerful argument exists for training teachers in the competencies thus identified.

It is characteristic of the current state of decision-making in teacher education that performance-based teacher education programs are being instituted on a large scale without any evidence of the relationship between specific competencies of teachers and children's achievement. The same statement can be made of programs for teachers based on "humanizing" education through "self-development" of teachers, or for programs in open education, or for any other programs. The research is silent on the associations between teacher abilities and children's learning.

It is not the purpose here to question the appropriateness of any element in teacher education programs that is not demonstrably associated with achievement of students. It seems perfectly reasonable that certain attributes of teaching and teacher education programs are desirable in and of themselves, regardless of our present knowledge of their effectiveness in changing behavior. For example it is worthwhile to help the teacher understand the history of teaching children from minority groups, or help the teacher understand various educational philosophies. It also is desirable that teachers learn to listen carefully to the thought expressed by children, and that they become reflective about their own actions. These characteristics are worth emphasizing in a teacher education program whether or not a clear relationship can be established between the attributes and the achievement of children. Nevertheless it would clarify a considerable amount of educational discourse if it were clearly understood which practices were being advocated on the basis of replicable research and which practices were being advocated for other reasons. Of equal importance, it would be useful to identify educational problems that seem most likely to yield to scientific approaches, and which must be approached by understanding value preferences, political constraints, and budgetary limitations.

e) There is a cluster of policy questions centering around effective strategies for educational change. During the 60's, educational change was seen largely as a sequential series of steps starting with theory, moving to research, followed by development -- then dissemination, diffusion, and finally evaluation. It was assumed, though seldom explicitly, that the teacher or teacher educator was a passive client awaiting the results of developmental activity undertaken by talented groups and based on firm and incontrovertible knowledge.

It became apparent after several years that educational change did not seem to occur the way change was assumed to occur in medicine or agriculture. In the case of medicine, pharmaceutical firms engage in research to develop new treatments for various diseases. When certain medication is found to be effective, pharmaceutical "detail men" carry the word to practicing physicians who try to make a match between symptoms spotted in their diagnosing rooms and the treatment and effects described by the pharmaceutical detail men. When Elliot Richardson was Secretary of the Department of Health, Education and Welfare, he seemed attracted to the analogue of the pharmaceutical detail man and claimed that we needed agents such as these in the field of education to carry the word of effective practices to classroom teachers.

In the field of agriculture, the United States has a well-developed network of extension agents who for decades have been informing farmers about methods of plowing, planting, and cultivation that increase yield. Agricultural practices seem to have been affected profoundly as a result. The agricultural extension agent model, also, has seemed attractive to educational policy makers during the 1960's, and an extensive literature has developed around the theme of educational change agents, their responsibilities and possible impact.

For a variety of reasons, the methods do not seem to work well when applied to the field of education. The teacher does not seem to be interested in "yield" in quite the same way as the farmer. Educational "treatments" do not seem as reliable as therapeutic approaches in medicine. Some observers, in retrospective analysis, point out that incentive systems differ for teachers as compared with farmers or physicians. They point out, also that teachers, in effect, have considerable latitude since the practice of one is not compared readily to the practice of another.

Whatever the reasons for the failure of recent models of educational change in teacher education or classroom teaching, there is a need to understand more fully how change has taken place and what strategies might be utilized in the future as a basis for policy.

At the moment in the United States there are clear trends, as have been indicated, toward locally-based decision-making authority. This shift to de-centralized decisions suits America's present conservative political mood. But, some claim, it is also a more realistic approach to change in education. The task becomes one of fostering and enhancing local innovation, rather than implementing what may be an alien instructional plan.

This policy issue entails discovering the optimal relationship between statewide and local decision-making in teacher education through realistic understanding of how it is that teacher education programs can reasonably be expected to change. There are presently a series of practices, effective or not, that have extensive historical roots. They are built into the folkways of teacher education. New approaches that seemed to violate the assumptions of these existing practices can be expected to meet resistance. Analysis may identify those folkways, their strengths and shortcomings. Change strategies based on such analysis may prove more effective than strategies that seem to ignore the existing system.

f) A further cluster of policy issues is associated with uniformity as against flexibility in teacher education. To what degree is it educationally and socially desirable to mandate a single program, however effective it seems, and thereby rule out competing alternatives? Some states are moving toward mandating PBTE programs. How desirable is this practice within a single state, and to what degree should we seek national standardization of teacher education programs? On the one hand, reciprocity across the fifty states in the licensing of teachers argues for a degree of standardization. On the other hand, our lack of knowledge of the effects of various teacher education programs, as well as our apparently conflicting goals for the educational system, seem to argue for governmental policy that preserves diversity.

As has been pointed out in the introductory section, managerial styles that have come into broad usage in the United States seem to suggest a uniformity in planning and management procedures that tend to favor certain kinds of educational programs -- those that reflect highly detailed predetermined objectives and carry an evaluation plan for ready assessment. But it is a major question in education whether our educational practices should be limited by the present state of our planning and assessment procedures. If there are significant outcomes of our educational programs that do not seem to be revealed by present planning and assessment methods, perhaps we should not rely exclusively on these methods.

Present techniques of management and evaluation tend to emphasize proximate goals. Tangential effects, long-term outcomes, and questions of worth tend not to be examined explicitly. For example a well-engineered instructional sequence can convey to a prospective teacher some specific skills associated with the teaching of reading. It may even be demonstrable at a later date that these skills are effective in teaching reading to children. But what kind of a reader is the teacher, and what kinds of readers does she educate in the schools? Is she broadly read? Is she reflective about the reading she does? Does she help instill a desire to read as well as reading skills? These questions are more difficult to answer than those associated with her possession of specific skills, yet they are important ones. Certain approaches that are effective in building reading skills may be counterproductive if the goal is to enhance the quantity and quality of voluntary reading.

We have a long history in the field of education of having our various curriculum efforts devolve toward these outcomes that can be most readily assessed. And so our educational programs tend to reflect the examination system in current usage. Particularly in a period when there is a gradual trend toward the child becoming more active in the management of his own learning, there is significant doubt about reliance on procedures that demand high order pre-specification of proximate results.

g) Then there is the policy issue of the degree to which teacher education programs should be integrated into regular university activities. While the United States does not display patterns still visible in many European countries of free-standing teacher education institutions, there are pressures toward greater autonomy for the teacher training function within the comprehensive university. Some of those who argue for stronger "professionalization" claim that teacher education governance should be similar to the governance of education in professions like medicine or law. In these fields, working practitioners cooperate closely with professors in the specialized fields to develop the appropriate curricula. The general university decision-making structure is usually by-passed. Thus all-university faculty senates seldom consider revisions in requirements for law or medical degrees, but they often play an active role in modification of teacher education programs.

Some observers claim that this procedure leads to programs that are undesirably impractical and too heavily weighted toward theory. Other observers claim that effective teacher preparation must be based on a rigorous general education.

In a typical four-year teacher preparation program, about one-quarter of the student's effort is devoted specifically to teacher preparation courses offered within the education department. The rest consists of courses in science, language and literature, social sciences, and arts. These requirements are not very different from those expected of the liberal arts graduate.

The issue of the appropriate mix of courses has been a vexing one, and the antagonists have usually been those in education and those in the arts and science faculties. The new entrants into the fray are the teachers speaking through their organized profession, and local school district school administrators arguing for a greater role in the design of teacher education programs.

h) Finally, there are critical policy questions associated with evaluation of the quality of teacher education programs. Much of the discourse about teacher education focuses on ideology. Ideological battles are far from trivial, yet there are policy considerations associated with standards and quality. To meet this particular issue directly, it would be necessary to identify those elements in teacher education programs that can be evaluated and compared regardless of ideology, and to develop appropriate evaluation methods. Otherwise there is a danger that shoddiness will parade as diversity, and the teacher education enterprise will be weakened appreciably.

For related purposes, summative evaluation procedures must be developed that accurately characterize the various teacher education programs. Since it is likely that teacher education in the United States will continue to appear chaotic to many observers for several years, it is necessary for the prospective student and the prospective employer to have the most complete information possible to aid in decision-making about entry into the program and recruitment of graduates.

Right now, school superintendents are able to go to the University of Houston or certain other institutions if they want teachers who are certified as having acquired certain specific competencies. They can go to the University of Florida if they want teachers who have been exposed to a "humanistic" program. But in addition to having a basis for judging the quality of these programs and others, superintendents need adequate description of all teacher education efforts if they are to make informed decisions. A policy question focuses on who carries the responsibility for this description inasmuch as program developers cannot be relied upon to provide all the evidence of significance to different audiences.

Clearly, policy issues in teacher education are basic as well as broad. And there is not much background in the United States -- or skill -- in educational policy analysis. Nevertheless, it seems desirable and in fact inevitable that policy issues will be approached more systematically in the coming years. That being the case, it is hoped that the issues outlined here will be examined carefully by interested parties and that the practices and policy questions highlighted in this document will add to informed discussion and ultimately to improved practice.

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ANNEX II

Research and Development in Teacher Education: Some Recommendations*

Studies are needed to find methods of judging the correspondence between the needs of teachers and the in-service education they receive. Research findings suggest, for instance, that in passing from teacher aspirant to experienced professional, students move through various stages of development. The pre-service stage and the early years of teaching are characterized by a desire to do the job well in the eyes of superordinates. There is little room for philosophical analysis or even reflective thinking during this phase. It is suggested by the research findings that once a teacher feels that he is able to meet the demands of the job, he then shows concern about the effects of his work on students. As this stage is passed, the teacher becomes more attentive to the functioning of the school in society.1/

If these are reliable findings, then it may be a mistake to offer identical programs to in-service and pre-service teachers, or even to all in-service teachers. The results of the research suggest that some grouping by stage of professional development would be beneficial. Differentiated teacher education programs should be developed and studied.

Once general dispositions are identified that seem to be desirable in teachers, studies are needed to catalog those behaviors on the teacher educator's part that advance or impede the development of those dispositions. Does grading by the teacher educator help or hinder the development of self-evaluation on the part of the prospective teacher? Does the emphasis on discussion sections which prize the sharing of feelings reduce the chances that teachers will become or remain readers of books and articles dealing with teaching? Does the advocacy positions of professors in colleges of education for or against prevalent ideologies reduce the likelihood that teachers will become critical thinkers when considering issues in education? Empirical studies of these relationships are needed to design appropriate teacher education programs.

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*The authors acknowledge the major contributions of Professor Lillian Katz to this section of the report.

1/For a review of this research see Frances F. Fuller, "Concerns of Teachers: A Developmental Conceptualization", American Educational Research Journal, Vol. 6, No. 2, pp. 207-226, March 1969.

At the root of many of the "personal development" approaches to teacher education is the idea that behavior changes in teachers that do not involve a corresponding change in beliefs and attitudes are ephemeral. Longitudinal studies of the belief structures of individuals and how these structures function to affect behavior and perceptions is needed to test this assumption more rigorously. Findings from such research efforts might suggest specific actions that teacher educators might follow both in selecting and training teachers.

As with any institution, the school exerts powerful forces of socialization on any newcomer. If schools are to change and develop to meet the needs of a changing world, so too teachers must change. If the pressures of socialization are inherently conservative, then researchers must study those forces to understand more completely how they operate to inhibit change. The need for research in this area is especially pronounced since a rapidly increasing number of programs in teacher education are assigning students to schools for a major portion of their training. It may be the case that young students are especially vulnerable to the socializing forces of the public school institutions, to the detriment of innovation and flexibility.

Teacher educators are intent about helping their students acquire a wide range of learnings. Some learnings are routine and mechanical, such as those related to running equipment or to record-keeping responsibilities. Others are subtle such as being sensitive to the pre-conceptions that students bring to a study of gravitation. Researchers can contribute to teacher education planning by identifying the experiences that are best suited for the acquisition of different types of learnings so that the skills, cognitions, and attitudes acquired in a teacher education program are indeed integrated and functionally related.

More analysis is required of the selection criteria for teacher education programs and their effects. It is our belief that much of the effort that is expended in the in-service training of teachers could be diverted to other areas if there were more astute initial selection of teachers. The measures currently used in selection efforts are mainly convergent ones: How much does an aspirant know, and what problems can he solve? It might be helpful to identify other abilities - for instance receptivity to new ideas; tolerance for ambiguity; ideational fluency; and the ability to anticipate responses of clients (students) in given situations.

Of course, what is desperately needed to advance knowledge in the field of teacher education is the identification of some variable or set of variables that can be accepted as indicators of effective teaching.

The problem that has plagued the advancement of knowledge in almost all helping professions -- counseling, psychiatry, the ministry, social work, and teaching -- is lack of such criteria. To identify such factors might revolutionize the field of teacher education.

If such factors were identified, we could better assess the influences that various elements contribute to the development of a teacher. Clearly students come to teacher education with certain predilections, aptitudes, attitudes, and skills. Almost certainly they acquire additional learnings during the pre-service stage of their training. In addition, through experience and in-service programs, teachers acquire other learnings. An interesting research question focuses on the weightings each of these sets of factors are likely to contribute to the criterion. Until an ultimate variable is discovered, attempts could be made to assess the weights on the more tentative measures now available to us: ratings of supervisors, ratings of pupils, judgments of parents, self-ratings, and even a measure of pupil growth.

In the United States, a very few institutions have a distinctive quality that is conveyed to most of their graduates. Bank Street College of Education, for instance, apparently instills in its students certain characteristics that are readily discernible. It would be important to identify such institutions to study the strengths and weaknesses such programs possess and to isolate those qualities that contribute to their unique character.

Finally, we need to examine closely the assumption on the part of many teacher educators that learnings stemming from systematic instruction tend to be non-enduring and dysfunctional. Whether we are teaching how to ask higher-level questions or how to compute chi-squares, there is evidence to demonstrate that the learnings that result are short-lived and often misapplied once the student has left the "testing" situation. Are there ways to make changes in the normal procedures used in systematic instruction to diminish this disappointing outcome? Are there ways to capitalize upon the normal bent of human beings to acquire learnings and understandings in a natural and non-systematic fashion so that they will also acquire the skills needed to become an effective professional?

II

THE EFFECT OF INNOVATIONS ON STAFFING PATTERNS AND TEACHER ROLES

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Summary

In order to assess the effects of innovations on staffing patterns and teacher roles in the United States it was necessary first to establish a base line by describing the "traditional school." The majority of classrooms were depicted as graded and self-contained, functioning under the leadership of one teacher.

Descriptions of innovations and pertinent research literature were reviewed to determine what types of innovations had had the most effect or most promise of effect on staffing patterns and/or teacher roles. After this determination was made, a list of sites where these kinds of innovations had been underway for some time was compiled and a questionnaire sent. From these data fourteen specific cases were isolated for analysis as being most pertinent to the subject under investigation.

The main body of the paper reports on these fourteen innovative practices, giving attention to such things as: the rationale for adoption; the changes which resulted in instructional strategies, teacher tasks, and staffing patterns; changes in resources, use of instructional technology, and building design; capital and operating costs; and evaluation. Table 5 summarizes the data from the fourteen innovative case studies, making comparisons easier.

As analysis of the data proceeded it became apparent that the writers were dealing with three categories of innovations and that it was helpful to organize the case studies in this way. Therefore, the cases are discussed under these headings:

(a) Differentiated Staffing: Horizontal and Vertical
(b) Technology Dependent Innovations
(c) Open Learning Plans

The authors draw several conclusions, among which are:

(a) Reducing class size does not necessarily improve learning results; some goals can be achieved as well in large group situations as in smaller ones - although not all goals.

(b) There are often less expensive ways of increasing educational effectiveness than reducing the teacher/pupil ratio.

(c) The process of incorporating innovations into the schools tends to bring about unexpected changes in the goals originally held by those who are conducting the innovation.

(d) There is a tendency to hire new personnel when innovations are introduced rather than to retrain existing staff.

(e) Even though not the primary goal, many program innovations are beginning steps towards more effective staff utilization.

(f) Innovations tend to increase the number and complexity of instructional decisions of teachers.

The United States experience with innovations suggests some implications for policy affecting staff utilization. It appears that greater productivity can be reached most expeditiously not through hiring fewer teachers, but through efforts to make teachers more productive through the use of non-certified staff, improved middle management concepts, and the use of instructional technology.

I. DESCRIPTION OF THE TRADITIONAL SCHOOL

The majority of schools in the United States are organized on a graded, self-contained class basis. About two school systems in ten use some non-graded organizations. About four systems in ten use team teaching in the elementary school and four in ten in the secondary school. In the majority, however, one teacher with one group (class) of students for one year in a separate room is the usual pattern; hence, the "self-contained" classroom descriptor.

In the United States, schools (usually a number of elementary and secondary ones) are administered as a unit called a school system or a school district. Not all schools within a system necessarily use the same organizational patterns or staffing patterns. The school system furnishes specially trained personnel to provide support services to classroom teachers within the school system. There has been a significant increase within the last five years in the number and type of specialists employed. Common types are: guidance counselors, psychologists, remedial reading and math specialists, social workers, speech therapists, and the like.

Most of the schools are graded. This means that students are assigned when entering school to Grade 1 whether or not they have attended nursery school or kindergarten. The students progress from Grade 1 to Grade 2, etc., secondary school ending with Grade 12. Normally, one year is spent in each grade. Probably, the majority of elementary schools operate largely on a "non-fail" or age promotion basis rather than on rigid content standards covered by examinations. Length of the school year is governed by the state. By far, the greatest number operate on a nine-month, 180-day school year. The majority have a school year composed of two semesters. A voluntary summer session is common in school systems of large or medium size (over 3,000 students per school district). This means teachers are, for the most part, unemployed during three months of the year.

A. Elementary School

The mean number of students enrolled in 1973 was 591 per school and the mean number of educators (teachers and others) per school was 26.

The mean class size was 27 pupils. It is common for pupils to arrive at 9 o'clock and to leave at 2 o'clock for younger students and at 3 o'clock for older ones. The students are randomly assigned; that is, the groupings into classes is not on IQ or achievement bases unless some very serious problem exists in which case slightly less than half of the schools would arrange some special grouping. The teacher who assigned his 27 pupils in a self-contained classroom environment has a considerable amount of freedom in the teaching strategies he may employ. He is restricted, of course, by such things as the general achievement expectations, the teaching materials available, the classroom facilities, and the attitude of school administrators and parents. Surprisingly, there is much less variation in teaching style from teacher to teacher than one would expect. Teachers tend to teach like the supervising teacher by whom they were tutored and are not, probably because of system expectations, very experimentally inclined.

B. Secondary School

The mean number of students enrolled in 1973 was 1,264 per school and the mean number of teachers per school was 63. Most secondary teachers teach five classes per day, comprising a total of 133 students. Secondary students commonly arrive at 9 o'clock and leave at 3 o'clock although there are many activities scheduled in the building at other hours, such as club meetings, athletic events, dramatic events, etc. In schools where many students are bussed, especially in rural areas, there are limitations on extra-curricular activities because of decreased use of the school building for an extended day. Until recently, these extra-curricular activities supervised by teachers were considered a part of the teachers' assignment. Lately, there has been a trend toward either reducing the assignments during the regular school day for teachers so assigned or paying extra for the "overtime". The school day in the secondary school is commonly divided into six 50 minute periods. Students register for four academic subjects which usually meet daily for recitation, lectures, laboratory work, discussion, and receiving of assignments. The term "academic subject" as used here would include not only subjects such as literature, mathematics, science, and the like but also fine arts, business education, and other vocational education courses. In addition, students may take other courses such as physical education, music, or art which may not meet daily. This schedule means that the student has some unassigned time each day for study, library work, and the like. Most teachers have one period per day for student or parent conferences, class preparations, and the like. Because there is much freedom of choice of curriculum, there tends to be some "natural selection" and, therefore, the classes are not as heterogeneous as in the elementary school, especially in Grades 11 and 12.

Teachers are usually grouped into academic departments such as language arts, foreign language, math, science, etc. The teachers at the secondary level, even more than at the elementary level, tend to operate individually in self-contained classroom units.

C. Staffing Patterns in Traditional Schools

We have seen that the mean class size in the elementary school is about 27 students per teacher and that of the secondary teacher is about the same -- about 27 students met in each of five different classes. The National Education Association of the United States with 1,400,000 members advocates lowering this pupil-teacher ratio on the premise that the result would be higher quality education and a work-load for teachers more commensurate with productivity and efficiency. In most industry, a lower ratio than 27 to 1 in fact exists for managers and workers. Certainly, it has been pointed out, the role of the teacher working with immature persons, makes it even more critical to have an appropriate relationship of children to adults.

Research has not clearly shown a relationship between class size and educational results. There are many reasons for this. Several factors contribute to the quality of education, and it is difficult to isolate the effect of one single factor by holding all others constant. Also, there is the problem of establishing quality standards against which the effects of class size are to be measured. For example, one could argue that class size has little effect if the goal is retention of factual information and the method is lecture.

An interesting study was reported in 1971 by the Institute of Administrative Research at Teachers College, Columbia University(3)*. They assessed with trained observers 20,000 classrooms using four criteria of quality: individualization, interpersonal regard, group activity, and creativity. The researchers found that, when measured against these indicators of quality education, there was a strong relationship between the class size and the score for that class. Quoting from the report:

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*Figures in brackets refer to Bibliography listed at the end of this paper.

"There are three breaks at the elementary level that have reached the significant factors -- when the class size drops from about 25 students to below 25; when it drops below 15 students and again when the class size drops to less than five students."

At the secondary level, the critical breaking points are 10 and 15 pupils per class. Teaching techniques changed as the class size changed. Some techniques achieved one or more of the four criteria better than others and those used in the large classes were the least effective ones. According to the study, it appears that the most economically efficient pupil-teacher ratio can only be established in relation to the desired goals.

The Rand Corporation conducted a study of outstanding Michigan schools in 1973 and found that the top Michigan schools had smaller class sizes, more teachers with five or more years of experience, and more teachers earning $11,000 or more annually. These results provided strong evidence that such schools were not statistical quirks*.

D. Tasks of Teachers

The teacher's "day" as we all know, is more than the time the teacher spends in class, face to face with students. One must, therefore, consider how the teachers spend their "teaching" time; that is, the 70% he spends on various teaching strategies. One must also consider time spent on other assigned responsibilities, both professional and non-professional.

The Institute of Administrative Research study referred to above has collected data concerning the percentage of time teachers spend in various teaching styles of techniques. The Table 1 summarizes their findings(3). (See next page)

Very few teachers have sufficient time during the "school day" to handle more than the face-to-face teaching, student conferences, and the necessary clerical and other non-professional aspects of their assignment. Teachers in the United States have been objecting to the increase in these non-professional chores.

After the school day is over, the teacher engages in instructional planning, selecting or producing teaching materials, grading papers, preparing examinations, parent conferencing, and from time to time in setting objectives and curriculum planning on a broader basis than for his own classes. The amount of time per week such activities consume depends on many factors such as the age of pupils and subjects taught, the experience of the teacher, school system standards and pressures, and the teacher's own professional standards.

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*Reported in "Report on Education Research" Washington, D.C.: Capitol Pubs, Inc., July 4, 1973, p. 4.

TABLE 1

ELEMENTARY AND SECONDARY OBSERVATIONS SCORED BY STYLE OF EDUCATIONAL ACTIVITY

Style	Elementary	Secondary
Question/Answer	0.16	0.19
Discussion	0.08	0.11
Lecture	0.02	0.10
Small Group Work	0.06	0.04
Library Work	0.01	--
Individual Work	0.14	0.14
Demonstration	0.03	0.04
Laboratory Work	0.01	0.05
Test	0.03	0.07
Movie	0.02	0.03
Television	0.01	--
Other	0.10	0.09
Seat Work	0.30	0.11
Rehearsal	0.01	0.01
Pupil Report	0.02	0.02

E. Summary

As has been stated the majority of classrooms in the United States can be described as graded and self-contained, functioning under the leadership of one teacher. This is what in this paper will be referred to as the traditional school.

In most schools and classrooms instructional goals include acquiring the skills of literacy and computation; extending the ability to communicate; understanding and practice of citizenship; familiarity with the arts including experience with some form of artistic practice -- usually in vocal or instrumental music and art; achieving an historical perspective through the study of local, national, and world history and geography;

understanding the fundamentals of science; becoming familiar with a variety of careers and, in some cases, competent in one of them because of the school program.

Such a description should not imply that all classrooms classified as traditional are alike in organization, methodology, or interpersonal relationships. Teachers are being taught how to use a variety of instructional strategies and how to match these strategies to objectives. This leads to more variance in the roles of teachers but it has little to do with staffing patterns and hence with the subject of this paper. The next section of the paper will deal with some innovative practices which either change the staffing pattern of a classroom of school or have potential for so doing.

II. INNOVATIONS AFFECTING TEACHER TASKS

In this section we deal with innovations which appear to have an effect on teacher role and staffing patterns. Information about these innovative activities has come from the literature, including articles in journals and reports of research studies, through interviews with individuals associated with the various activities and through a questionnaire developed for the purpose of this study. Three categories of innovations have seemed somewhat arbitrarily developed. In the first, we discuss differentiated staffing and further divide that category into horizontal differentiated staffing and **vertical differentiated staffing**. We then describe several forms of technology-dependent instruction, and conclude Part II with four examples of what we have chosen to call open learning plans. Clearly, there is overlap among these categories; their primary usefulness is that they made our job of describing more manageable.

A. Differentiated Staffing

Staff differentiation in the public schools of the United States is not a new concept. The purposes and manner of implementation have undergone and are still undergoing change. The oldest model of differentiation was teacher/principal/superintendent with teachers being viewed more or less as interchangeable parts which performed like tasks for like pay. Departmentalization by subject areas offered a degree of specialization, but chiefly in terms of the content with which each teacher dealt. The adding of supervisors and specialists and, in about 1948, non-certified staff as teacher aides and assistants represented another type of differentiation. The roles were additive to the classroom teacher and did not result, to any degree, in differentiation of roles among teachers.

Team teaching was introduced in the mid-1950's. While affecting the way teaching is performed, it causes only occasionally different job descriptions or pay scales for teachers. In other words, in team teaching the differentiation is "horizontal" in nature -- different tasks but equal in value.

In the 1950's and 1960's, the National Association of Secondary School Principals (NASSP) started a series of staff utilization studies under the leadership of Lloyd Trump. By 1960, these had developed into an innovative strategy commonly known as the Trump Plan which promoted new ways of organizing students and teachers to accomplish the teaching/learning tasks. The thrust was to utilize variation in size of student groups depending on the nature of the learning task - large groups, small groups, and independent study - accompanied by flexible scheduling (variable time allotted per learning task). Today, NASSP is continuing its leadership in program refinement and implementation strategy in what is called the NASSP Model Schools Project involving 34 schools.

The innovative programs in team teaching, chiefly at the elementary level, and the NASSP models at the secondary level, have influenced hundreds of schools and also have prepared the way for more radical experimentation in staff utilization involving hierarchical or vertical differentiation of teaching staffs and a departure from the single salary schedule. The first such experiment in differentiated staffing was conducted in Temple City School District, California in 1968. The U.S. Office of Education itself has funded 24 model projects which roughly meet this definition: "A teaching hierarchy with extensive vertical and horizontal differentiation of roles and with job responsibilities keyed to a differentiated pay scale."(11.8) Supporters of differentiated staffing see in it possibilities of overcoming some current problems in education.

(i) Teacher Role Dissatisfaction

As teachers' competency increases, there is no longer justification for instructional decisions being made by supervisors and administrators further removed from the clients and little better prepared to make the decisions. Teachers are demanding inclusion in instructional decision-making. Differentiated staffing provides a mechanism for accomplishing this.

(ii) Lack of a Career Ladder

Salary increases in the traditional school depend on years of service and number of college credits accumulated, not on the nature or quality of the services performed. Teachers who wish to advance in their profession must become supervisors or administrators. Good teachers should be able to earn as much as administrators while following a career as a classroom teacher. It is recommended, therefore, as a means of providing this ladder by many developing differentiated models, that salaries for some classroom teachers should be at least two times the level of the lowest classroom teachers' salary.

(iii) Cost Effectiveness

The input/output model of efficiency is being applied to the schools as educational costs increase. The educational establishment's answer to quality improvement is to make the schools more labor-intensive by adding "more of same". Staff differentiation coupled with use of para-professionals provides a possible alternative to be tested.

(iv) More Humane and Individualized Instruction

Critics say that schools dispense lock-step education geared to middle class students who are print oriented and academically motivated. The students of the schools, as well, are becoming more varied in their social background, educational interests, and style of learning. Teachers, too, vary as to the kind of students and content with which they are most effective as well as finding themselves more successful with certain teaching styles than with others.

1. Horizontal Differentiated Staffing: "3 on 2" in Hawaii

In Hawaii, our only state with a single unified school district, the elementary schools were plagued with a double problem -- large classes of youngsters in contained classrooms and great heterogeneity caused primarily by differing language patterns. The solution created to solve the problem was the "3 on 2 Program". In this scheme, which is being incrementally implemented, three teachers assume responsibility of two groups of about 32 children each. In some situations there is an element of differentiation in that teachers with varying backgrounds are placed in the team of three so as to better match students and teachers. Advocates of the plan say that this approach is better than reducing the size of contained classrooms because it creates settings in which professional collegiality can grow and be beneficial to a specific group of learners.

The initial capital investment for the "3 on 2 Program" is not as high as might be expected because in most cases a single wall between two classrooms could be partially removed in order to create a double classroom from an existing "egg crate" building. The continuing costs are, of course, high because of decreased student/teacher ratios. There is evidence in improved standardized test scores that the **program** is justifying its costs.

A second example concerns the various flexible scheduling enterprises where the overall pupil/teacher ratio remains the same but the ratio changes significantly given the task to be accomplished. There are few formalized expressions of this approach; there are scores of informal ones since all teachers in some way or another will vary the size of the group with which they are working because of the nature of the particular learning tasks at hand. At the secondary level, the school will often have smaller classes in science classes, or in certain advanced math classes and larger ones in physical education or music. In the section of this report which deals with differentiated staffing and later in this section when we will touch on team teaching, attention is given to the more formal ways devised to change ratios depending on task.

2. Horizontal Differentiated Staffing: Individually Guided Education (IGE)

IGE is a comprehensive system of schooling at the elementary level. **The** system includes a model of instructional programming for individualized instruction, measurement devices and evaluation procedures, curriculum materials, a method to bring about productive home-school relationships, and a program to facilitate the adoption of IGE in the schools. This system can be visualized as follows:

IGE is being developed by the Wisconsin Research and Development Center for Cognitive Learning where much of the original research on learning, instruction, and individual difference continues to take place(12). It is this research that shaped the program as it is now seen in more than 650 schools in 14 states. The system is concerned with changing the organization for instruction, including the patterns of staffing so that instructional planning and implementation can occur. The IGE organizational arrangement in which the program occurs is called the multiunit school.

ORGANIZATION OF MULTIUNIT SCHOOL WITH 600 PUPILS

Central Office Staff

State Department of Education Consultants

Principal

Unit A	Unit B	Unit C	Unit D
1 Unit Leader	1 Unit Leader	1 Unit Leader	1 Unit Leader
4 Teachers	4 Teachers	4 Teachers	4 Teachers
1 Instructional Aide	1 Instructional Aide	1 Instructional Aide	1 Instructional Aide
1 Clerical Aide	1 Clerical Aide	1 Clerical Aide	1 Clerical Aide
150 Pupils, Age 5, 6, 7	150 Pupils, Age 7, 8, 9	150 Pupils, Age 8, 9, 10	150 Pupils, Age 9, 10, 11

Source:

Copied from Individually Guided Education and the Multiunit School, A Publication of the National School Public Relations Association, Washington, D.C.: The Association, 1972, p. 8.

IGE's instructional materials are designed to support the multiunit organization. Curricular materials are already on the market or are being prepared in reading, motivation, mathematics, prereading and environmental education. Four tasks characterize IGE curriculum development work as it takes place in the preparation of materials or in the work of the building-based instructional improvement committees:

- Determining what is reasonable for children to learn within a given curricular area;
- Which children need to learn what assessment tools related to each curricular area;
- Defining effective ways of teaching the skills or concepts to be learned;
- Determing ways of knowing what each child has learned*.

Initial per pupil costs for materials are about $10.00 higher than usual.

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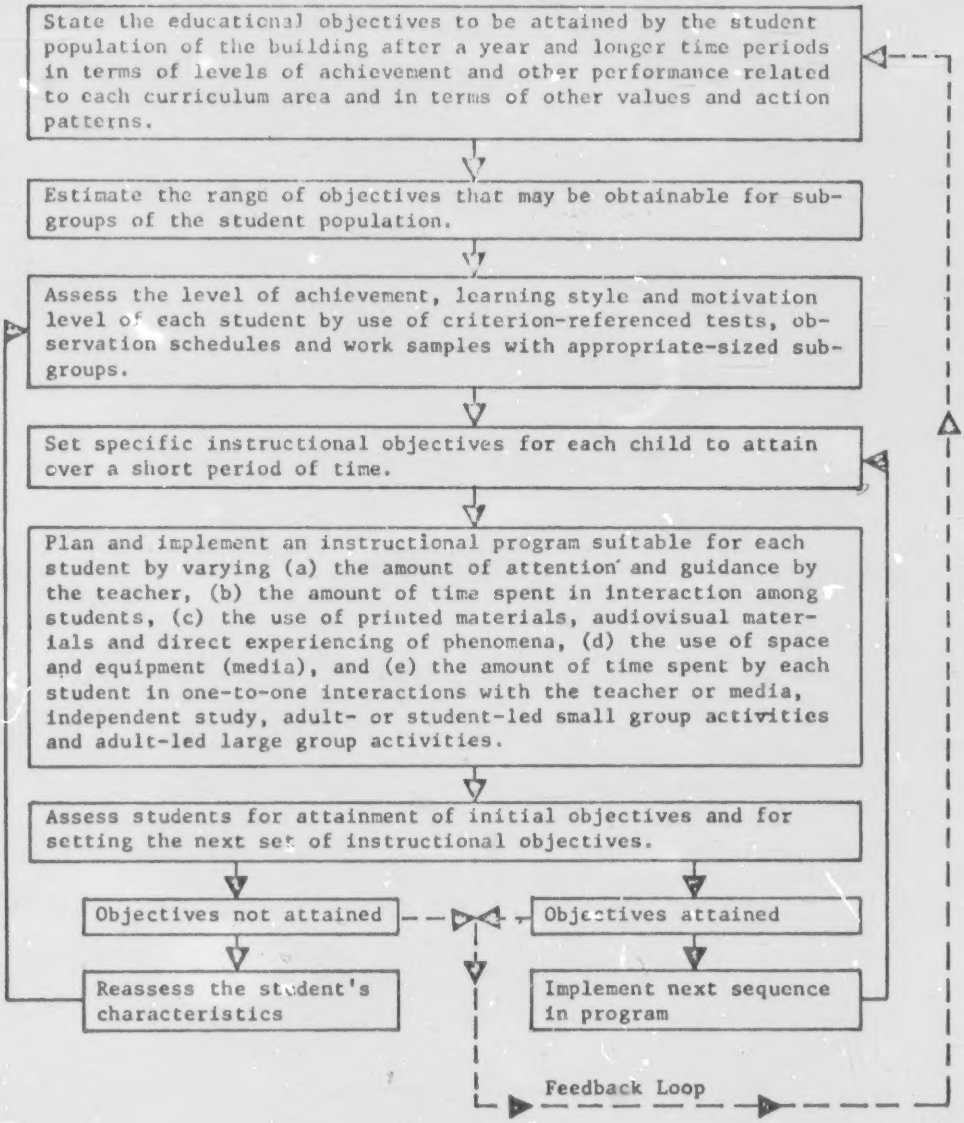
* Curriculum theorists will recognize these four tasks as similar to those proposed as basic to curriculum development work by Ralph W. Tyler in Basic Principles of Curriculum and Instruction, Chicago: University of Chicago Press, 1950.

INSTRUCTIONAL PROGRAMMING MODEL IN IGE*


State the educational objectives to be attained by the student population of the building after a year and longer time periods in terms of levels of achievement and other performance related to each curriculum area and in terms of other values and action patterns.
Estimate the range of objectives that may be obtainable for subgroups of the student population.
Assess the level of achievement, learning style and motivation level of each student by use of criterion-referenced tests, observation schedules and work samples with appropriate-sized subgroups.
Set specific instructional objectives for each child to attain over a short period of time.
Plan and implement an instructional program suitable for each student by varying (a) the amount of attention and guidance by the teacher, (b) the amount of time spent in interaction among students, (c) the use of printed materials, audiovisual materials and direct experiencing of phenomena, (d) the use of space and equipment (media), and (e) the amount of time spent by each student in one-to-one interactions with the teacher or media, independent study, adult- or student-led small group activities and adult-led large group activities.
Assess students for attainment of initial objectives and for setting the next set of instructional objectives.
Objectives not attained
Objectives attained
Reassess the student's characteristics
Implement next sequence in program
Feedback Loop

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*Copied From Individually Guided Education and the Multiunit School, A Publication of the National School Public Relations Association, Washington, D.C. : The Association, 1972, p.7.

[illegible]E has not identified a satisfactory procedure for relating costs and achievement. Generally, the multiunit organization is being run at the same or only slightly higher costs than traditional organizations. Evidence, based on eight years of research indicates equal or greater gains in achievement based on standard instruments and significant gains in such important characteristics as learner self-concept; attitudes towards peers, teachers, and other adults; school morale; vandalism to school property; and attitudes towards the community.

5. Horizontal Differentiated Staffing: NASSP Model Schools

The NASSP program has several basic goals including: creating and providing varied strategies and environments to match individual differences among learners and differences among teachers; to more sharply define teacher roles (as distinct from aides and others) and to cause the principal's role to be one of participant in instructional improvement work, leaving management functions to others; to sort out essential learnings for students and to reduce what is required thus allowing more opportunities for pursuit of student's own interests; and to develop better methods of evaluation.

Trump and Georgiades have described several characteristics of the program:

(a) The principal spends three-fourths of his time working directly with teachers to improve instruction and learning.

(b) Differentiated staffing and other arrangements produce changed roles for teachers.

(i) Instruction Assistants (average of 20 hours per week per teacher) oversee pupils' independent study, etc.; Clerks (average of 10 hours per week per teacher) keep records, etc.; General Aides (average of 5 hours per week per teacher) perform tasks not requiring competence in subject areas or clerical skills.

(ii) Teachers are scheduled an average of not more than 10 hours per week with pupil groups (2 hours with large groups, 8 hours with small); the balance of 20 hours, mostly on school premises, are for keeping up-to-date, developing materials, evaluating, conferring and supervising.

(iii)Most teachers serve a new role as teacher-counselor (helping about 35 pupils individually to plan, schedule, and change their independent study time and collecting information about each pupil's progress and difficulties).

(iv) Teachers work individually in offices or in groups organized by departments or on some other basis.

(c) Individualized learning methods emphasize motivation, continuous progress, self-direction, individual scheduling, personalized evaluation, and attention to personal needs and interests, while maintaining pupil accountability.

(d) Curriculum revision separates basic, essential learnings from other learnings that mainly are appropriate for pupils with special talents and interests.

(e) Improvement of teaching and learning requires that money and facilities be utilized differently.

(i) Financial input is analysed in terms of gains (product output) in the foregoing items 'a,' 'b,' 'c,' and 'd' (principal's role, teaching roles, individualized learning, and curriculum revision). Improvements in those areas do not necessarily cost more.

(ii) Most conventional classrooms become learning centers (both kinds: study and work) for independent study; a few rooms are divided for small-group meetings and for teacher offices and workrooms; a few spaces are needed for large-group instruction (motivational presentations).

(iii)Priorities for new construction or for purchase of supplies and equipment are based on what will produce the most good for the most pupils, in terms of the goals of the teaching-learning methods in the Model.

(f) Increased emphasis on evaluation is essential to provide feedback for directing further improvements, and to produce confidence in the changes. (10:109-118)

Clearly, new teacher roles are required in such a school program. In some schools these roles are acquired by reducing the scheduled class meetings per week in order to give teachers time for independent study and the development of materials for pupils' continuous progress. In others, teachers are helped to develop continuous progress materials for pupils to use, including adapting their current basic textbooks, the development of "guidesheets" that help students to become more independent, and the preparation by the staff of a learning package so that they become familiar with more sophisticated self-directing, self-motivating, self-pacing materials for pupils. Also, teachers are helped to improve their methods in conventional classrooms by helping teachers to reduce the amount of time that they talk to the entire class (hopefully, not more than 20%). In conventional settings, attempts are made to increase the quantity and improve the quality of independent study periods. In these periods, the emphasis is less on credit material and more on audio and visual materials. In many classrooms, instead of the conventional, and practically useless, "recitation" or total-class discussion, classes are being divided into groups for discussion purposes or for "buzz sessions". Pupils are being helped by teachers in these conventional classrooms to learn how to discuss and to learn better how to relate to each other.

Trump and Georgiades propose several new ways to use facilities and money:

(a) Reduce overcrowding by introducing more independent study, large-group instruction (presentations), and small-group discussion.

(i) Remove a wall between two classrooms and substitute chairs for school desks (arranged in semi-circular fashion to face the presenter now stationed in the front, on the window side now covered by a curtain or green paint); this facility houses twice as many pupils as in conventional classrooms.

(ii) Install two partitions in a conventional classroom to produce 3 small-group discussion rooms, substituting chairs in a circle for school desks; this arrangement accommodates 50% more pupils in the same space.

(iii)Change classrooms into study and work centers for independent study; schedule more pupils for some supervised study and work in the community, with appropriate arrangements for accountability.

(iv) Convert corridor, lobby, and cafeteria spaces into independent study areas; pupils can walk through such areas while other pupils are working, especially under flexible and individualized schedule arrangements.

(b) Make better use of the potential talents of the professional staff:

(i) When a teacher retires or leaves, use the salary to employ clerks, instruction assistants, and general aides.

(ii) Gradually increase the number of qualified adults that serve the pupils while reducing the number of certificated teachers, at the same time increasing the time that teachers have free from scheduled classes of pupils.(10:118-119)

An analysis of the model plan makes clear two important points. The basic interest is not in saving money. (The article from which the above was quoted is titled "Doing Better With What You Have"!) Trump admits that in the early steps of implementation, costs are frequently higher because of expenditures for such items as building remodeling. Most schools, however, can function within the normal financial support base even though a few do spend more for basic supplies, salaries for non-certificated support personnel, and for audio-visual materials and equipment.

Secondly, it is evident that no mention is made of hierarchies of teachers or pay differential except between certified and non-certified staff. Some hint of long-range implications are inherent in the following suggestions for analyzing the present school situation:

(a) In view of the fact that many studies now indicate that teachers generally are more concerned about working conditions than about higher salaries, how much work are teachers doing now that could be done by less costly clerks?

(b) How much work are teachers doing now that could be done by part-time instruction assistants, i.e. persons with some training in the subject field or grade level of the teacher, but not necessarily as much training as required for certification as a teacher? (Examples of such persons are housewives, college students, and retired teachers.)

(c) What are teachers doing now for students that students could do for themselves -- if the students had the time, the places, and the materials for independent study? (Such an arrangement can save teacher time and energy while giving students more experience in "learning by doing" and "responsibility for their own learning" - both desirable educational goals.)

(d) Have the techniques of job analysis been applied to the teaching group in order to discover what teachers must do and what may be done more economically and efficiently by less costly other persons and/or machines? (10:119-120)

4. Vertical Differentiated Staffing: Temple City (California) Model

The Temple City Model was built around a hierarchical staff differentiation concept. Dwight Allen, a key architect of the plan, made two basic assumptions. First, that a variety of teaching roles, based on task analysis, would result in more effective staff utilization; and secondly, that the career ladder concept would be an incentive to teachers to remain in the profession and more particularly to remain in classroom teaching. Table 2 shows the plan of differentiation which was in use in Temple City in 1969-1971.(30:79)(see next page)

Several problems still remain unsolved in the Temple City Model plan:

(a) Some teachers, especially the older ones, feel their status and prestige has been reduced.

(b) Differentiated staffing did not necessarily result in differentiated instruction.

(c) New teaching roles tend to be covered by adding new positions rather than by redistributing tasks to available staff.

(d) The hierarchical structure tends to become more rigid rather than more flexible as time goes on.

Those closely related to the Temple City work have concluded that a major achievement has been the active involvement of teachers in the decision-making process.

TABLE 2

TEMPLE CITY DIFFERENTIATED STAFFING PLAN
1969-71 (MODEL 3)

			Nontenure
		Nontenure	MASTER TEACHER Doctorate or equivalent
	Tenure	SENIOR TEACHER M.A. or equivalent	
Tenure	STAFF TEACHER B.A. and Calif. Credential		
ASSOCIATE TEACHER B.A. or Intern			
100% teaching responsibilities	100% teaching respons.	3/5's staff teaching respons.	2/5' staff teaching respons.
10 Months $6,500-9,000	10 Months $7,500-11,000	10-11 Months $14,500-17,500	12 Months $15,646-25,000
INSTRUCTIONAL AIDE II	$6,600-7,500		
INSTRUCTIONAL AIDE I	$4,000-7,500		
CLERKS	$5,000-7,500		

5. Vertical Differentiated Staffing: Mesa (Arizona) Model

While the Temple City Model was based on a new organizational pattern or structure of staffing, the Mesa, Arizona, plan is based on a process model from which staffing patterns can emerge. The Mesa Model is based on these ideas:

(a) New teaching functions or roles should be based on needs assessment of learners.

(b) No permanent hierarchy of teacher roles should be established; the roles should shift as student needs shift.

(c) Differential pay is of secondary importance.

(d) Emphasis on "output" (student results) is more important than on "input".

James Zaharis describes the goals and objectives in this way:

General Goal: To specifically improve pupil performance of the Mesa Public Schools' program.

The Mission: To develop a more flexible and responsive staff deployment model.

The Desired Objectives

(a) A new staffing model which

(i) Is client-centered (roles are based on defined student objectives and centered on tasks to be accomplished from defined student needs);

(ii) Creates a model in which roles are fluid (that can be changed in relationship to one another as the tasks change and student needs change);

(iii)Fosters a humanistic school climate conducive to learning;

(iv) Promotes a shift from teaching *per se*, to the management of learning;

(v) Provides a means whereby teachers can develop a career in teaching as in other professions and be paid commensurate with what they may earn as administrators if promoted;

(vi) Provides a criterion of teacher salary which reflects responsibility and performance of students rather than solely time served or units accrued.

(b) A system of accountability is developed whereby all those responsible to the public for the education of children may be related to the growth and development of the student (the client);

(i) Performance outcomes expected of students (and validated) are defined as baseline criteria for the schools;

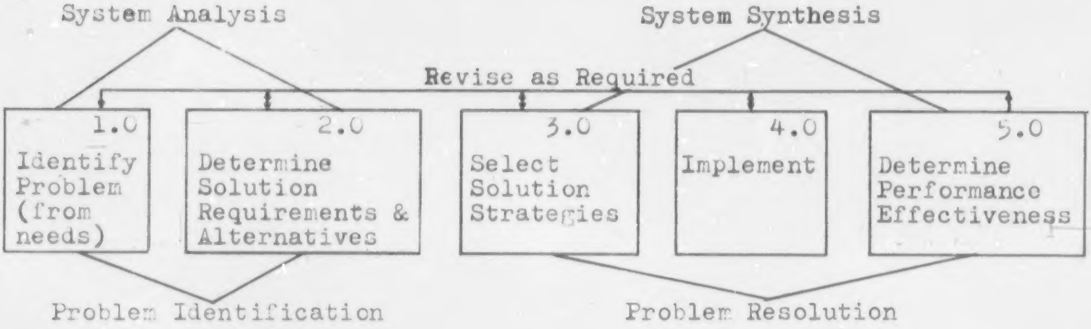
(ii) A system of contracting is developed whereby the professional staff is accountable for the expenditure of an agreed upon number of resources to educate children in a specific way and which will include personnel, time, materials and related sub-contracted services desired. (30:268)

The process revolves around a six-step problem-solving model.

The Mesa Project requires school staffs to submit "bids" to the Board of Education for achieving specific outcomes. The "bids", or internal performance contracts, relate objectives to real resources such as staff, materials, and travel. The assumption is that if teachers are to be held accountable, they must be able to control the resources for accomplishing objectives.

TABLE 3 (30:280)

SIX-STEP SYSTEM PROBLEM SOLVING MODEL


System Analysis
System Synthesis
Revise as Required
1.0
Identify Problem (from needs)
2.0
Determine Solution Requirements & Alternatives
3.0
Select Solution Strategies
4.0
Implement
5.0
Determine Performance Effectiveness
Problem Identification
Problem Resolution

Teacher pay is governed by a base commission with the provision for increasing the baseline figure by (a) accepting responsibilities and (b) being paid additional on the performance delivered. A hierarchy of roles is built as student needs indicate, and the roles are temporary; that is, the hierarchies are abolished when the objectives are met.

6. In conclusion

From the two examples of vertical differentiated staffing briefly described, it is obvious that the models vary greatly in the assumptions and theoretical constructs upon which they are based and that this in turn results in very different types of models. It should be understood, also, that these described are only two of numerous models now being tested. Fenwick English, in a recent book(30:104)provides this comparison of three models of differentiated staffing, the two described above and a third one.

An evaluation of eighteen differentiated staffing programs was conducted in 1971(30:343-361)covering 976 educators geographically spread throughout the United States. Ninety-four per cent were in the United States Office of Education (USOE) funded projects dealing with differentiated staffing. An evaluation model was developed which defined the concept and delineated components: Individualism (regard for self); Collegiality (interpersonal interaction); Professional Disposition or Commitments; Work Flow Structures (decision-making, communications, etc.); Perpetuation Structure (recruitment, employment, training and reward system); Systems Self-Renewal (needs assessment, philosophical bases, etc.); and accountability (monitoring achievement). The study collected some interesting information, particularly about teacher tasks:

(a) Personnel viewed as most important and were most in agreement with elements covered under "perpetuation structure"; collegiality was viewed as almost as important; accountability also received high marks.

TABLE 4

TENTATIVE LIST OF THE CHARACTERISTICS OF THREE DIFFERENTIATED STAFFING MODELS ON TEN BASIC CONTINUUMS OF PROJECT DEVELOPMENT

CONTINUUM	TEMPLE CITY, CA	SARASOTA, FLA	MESA, ARIZONA
1. Hierarchy of roles	fixed-static	semistatic	fluid-shifting-impermanent
2. Degree of teacher-centeredness	almost wholly teacher centered	semi-teacher centered	student needs form basis for task analysis and role development
3. Basis of role structure	analysis of teacher tasks	analysis of teacher tasks	learning objectives for pupils
4. Model site (school) specificity	very little model site adaptability	units are interchangeable or equated	wholly site specific
5. Salary structure	fixed/hierarchical and parallels administrative career ladder	semihierarchical	salary base plus (+) role contribution during "bid" period
6. Utilization of output as feedback to change model of DS degree of closed-loop provisions	roles and role numbers are not dependent upon feedback (student) utilization	not a planned part of model but adaptable	dependent upon feedback on pupils from performance contract to contract
7. Role of pupil objectives in model	ancillary	generalized pupil tasks form role base	dependent upon pupil objectives based on needs assessment
8. Curriculum focus	disciplined centered or subject matter centered	same as Temple City	product centered within and across existing disciplines
9. Evaluation criteria	means centered/incidental data gathered	means centered	criterion and product centered
10. Model priorities and "mix"	(a) structural change (b) people (c) curriculum (d) outcomes	(a) structural (b) curriculum (c) people (d) outcomes	(a) outcome centered (b) people centered (c) curriculum centered (d) structural change

(b) The planning committee of all eighteen projects listed as a goal "making effective use of available resources within the existing staff structure by providing teachers with adequate non-professional help". Other goals listed by 2/3 or more of the project planning committee were:

(i) Differentiating staff responsibilities based on a breakdown of educational and instructional tasks.

(ii) Providing each child with learning resources appropriate to his individual needs.

(iii) Relating differentiated responsibilities to salary differentials.

(iv) Providing continuous and relevant in-service training based on instructional objectives established by the staff.

(v) Insuring that decisions are influenced by individuals who will be called upon to implement them.

(vi) Increasing the staff's professional commitment to the student.

(vii) Improving interpersonal relations skills in the schools.

(c) The projects agreed that they have only begun to attain the goals they consider important.

(d) Expectations from the community, school boards, etc., are too high in the early stages of experimentation.

(e) It is not known yet whether students will learn more under flexible staffing, but the indications so far are that they will not learn less.

(f) Teachers who have been a part of differentiated staffing tend to be convinced by the rationality of flexible staffing although only 74% wish to work in a school where there was shared planning and direction of classroom instruction(30:351-352)

Differentiated staffing does not guarantee greater economic efficiency; in fact, it tends to be more expensive in the beginning chiefly because of staff training costs and the need to remodel physical facilities. Also, the tendency is to accommodate the new staffing plan to existing salaries and staffing structures rather than to substitute immediately one that might be more cost effective.

B. Technology Dependent Innovations

The use of audio-visual materials occurs or may occur in all the innovations previously discussed. However, they were not media or technologically dependent; that is, if the use of the audio-visual materials was removed, the instructional system would not break down. In this section, innovations will be discussed that are dependent on one or more media or on a technological system. The term "media" is used to refer to those materials and devices used in the processes of teaching and/or learning. The term "instructional technology" is defined as a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives and employing a combination of human and non-human resources. "Process" is an essential element of technology, but not of audio-visual materials.

There have been a fairly large number of studies comparing the use of instructional television, programmed instruction, computer-assisted instruction, film courses, and the like with conventional instruction. The research shows fairly conclusively that, when used for suitable instructional tasks, there is no significant difference between conventional and the mediated forms of instruction. If tasks of human teachers can be differentiated so that some teachers perform some roles and others different roles, and teacher aides still others, then it is only a small step to the sorting out of roles that are appropriate for non human resources. Experimentation with this type of differentiated staffing has been slower than the experimentation with human resources partly because of the tremendous expense in the production of the instructional materials. There are also problems of teacher attitude and teacher training. In this section, three categories of technology-dependent instruction will be discussed and cases cited: Intensive use of a single medium -- closed circuit television and computer-assisted instruction; multi-media usage; and an instructional system with minimal use of audio-visual.

1. Closed-Circuit Television - Washington County, Maryland

Washington County, Maryland, has completed seventeen years of continuous use of classroom television. The County covers 468 square miles and contains forty-five schools and a junior college. The schools are linked by coaxial cable to form a closed-circuit television network. Six lessons can be sent simultaneously. Many classrooms are equipped with two twenty-one inch television sets. There is also some use of large-group viewing of televised lessons. Such areas are equipped with several sets or with large screens.

Televised lessons are used at all grade levels, although not in all subjects. Elementary pupils spend as much as 13% of their classroom time watching television lessons which vary in length from thirteen to twenty-five minutes. Junior high school pupils spend almost one-third of their time in televised lessons, but high school pupils seldom spend more than 10% of their time.

The studio and classroom teachers form a team. Both are involved in planning the televised lessons and in the evaluation of them. They are paid according to the same scale, and studio teachers are chosen from the regular County teaching staff on the basis of experience and ability.

The television teacher is relieved of all classroom routine, so that he has time to plan his lessons with care and ingenuity, develop needed instructional materials, and keep them up to date in a way that the classroom teacher cannot.

A televised lesson, however, cannot meet individual differences, so the classroom teacher using a teacher's guide plus his own ingenuity, follows up the televised lessons in ways to meet the needs of the individual students. Other audio-visual materials may be used by the classroom teacher; for example, to follow up the conversational French taught through television from Grades 3 to 8, there are available tapes, recordings, and supporting visual materials. Washington County schools have a fairly extensive educational resource center to supply such items as slides, art reproductions, tapes, records, photographs, and other instructional aids.

After the introduction of television, there was a noticeable gain in student achievement in most subjects taught. This was true regardless of grade, subject, range of ability, or class size. The Washington County staff does not claim that television was solely responsible for the improvement, but they do feel that it contributed to the overall situation which made the achievement possible.

Per pupil expenditures in the County including the cost of television instruction compare favorably with those in the rest of the United States. A report issued after the first five years of the experiment stated:

> "The redeployment of personnel and equipment made possible by television has produced savings which cover the annual operating costs, and in terms of duplicating in conventional classrooms what is now offered on television, the County's savings are substantial. Without television, the County would require more than 100 additional teachers and a budget increase of almost $1,000,000 to duplicate the courses that have been added to the instructional program. This is more than three times the annual operating cost of the television network. For example, without television, it would cost more than $250,000 annually to provide arts and music specialists for the elementary schools."(15:2)

The redeployment of personnel referred to is related to the large group television viewing mode in use in junior and senior high schools. One example is cited:

> "... a junior high school teacher formerly taught five sections of thirty pupils -- 150 pupils -- every school day. This same teacher might now have during the first period of each school day, 120 pupils (or four sections of thirty) in an auditorium for

a large-group television lesson. During the remainder of the day he might meet each of these four sections, one by one, for classroom work. Thus, at the end of the school day, the teacher has, in effect, taught eight sections, whereas before he taught five; and yet his work load is lighter, because he grades and keeps records on only 120 pupils instead of 150. Television thus makes this teacher the equivalent of one and three-fifths 'pre-television' teachers."(19:19)

2. Computer-Assisted Instruction (CAI)

CAI is another promising type of technology with which we in the United States have been experimenting over the past decade. With the availability of more computer programs, more experience in the development of software, and the lowering cost of the hardware, the use of CAI, especially of the drill-and-practice type, has spread from rural schools in Mississippi to large city school systems. Probably the most extensive use of CAI is with the Stanford University drill-and-practice type program in elementary arithmetic, which in 1973 reached 19,000 students. Because the work of Suppes has been long-term in nature and intensive in character, it seems appropriate to explore the Stanford University experience before citing specific school experiences.

(a) Stanford University Computer Assisted Instruction Experiments:

Patrick Suppes and staff at Stanford University have had ten years of experience with computer-assisted instruction(23). The first program developed was an elementary mathematical logic which was closely followed by the arithmetic drill-and-practice program. During the ten-year period, these programs have undergone continuous refinement, the number of students involved has been greatly expanded, and new subject areas have been covered. There has also been some experimentation with some courses where the total instruction was via computer.

The display device in use consists of a cathode-ray tube, commonly called a "scope". It can display points of light in an area 10 inches high by 10 inches wide with 1,024 possible positions on both the horizontal and vertical axes. In addition, 120 characters may be displayed in five different sizes. It is also possible to display vectors by identifying the end points. A typewriter key-board is attached to the scope and may be used to send information from the student to the computer. There is much reliance on simple, inexpensive equipment. For example, teletypes are considered ideal for both experimental and catalogical purposes since young children can operate them easily. To the teletype, if required, can be added a headphone jack with a small gain amplifier that can convey vocabulary of some 5,000 words. With this type of equipment, which is used in the Stanford reading program, the cost of a daily twelve-minute lesson per student is about forty cents.

In 1966-67, courses were developed on symbolic logic and modern algebra. These were self-contained, tutorial, computer-assisted instruction given at a teletype terminal. Very little group instruction occurred, but students were able to ask questions of a staff member who was available in the teletype room. The following year, elementary Russian was introduced again as a self-contained CAI program. Later, a second year computer-based Russian course was added. Still later, a remedial mathematics course for college students and a tutorial program in computer programming was added.

In 1968, a CAI program in reading to be used by children in Kindergarten through Grade 3 was introduced as an adjunct to classroom instruction. It stressed the decoding aspect of reading. The CAI lessons were twelve minutes in length, although one experimental group used programs up to thirty-six minutes per day, and the rate of progress per hour was equivalent to that of the groups using three twelve-minute sessions indicating that young children did not lose interest in the task during the longer periods. Seventy per cent of the teachers in the experimental group said that their children interacted well with the program and that they did not feel isolated or neglected by the teacher.

One of the aspects of the investigation of the Stanford University Project had to do with the feasibility of teaching mathematics and reading as an integral part of an elementary school program over an extended period of time. In carrying out this experiment, teletypes were used in some schools as far as 2,000 miles from Stanford University. In other cases, the connection to the Institute's computer was by ordinary telephone line.

In the beginning, the Stanford CAI programs were developed to be used in schools organized on the self-contained classroom basis. In 1968, experiments started with a revision of the drill-and-practice program in arithmetic to make it more useful in a continuous, non-graded, individual school program. Suppes explains this transition as follows:

> "The question used to determine what types of problems a child should receive on a drill changed from 'What grade is the child in?' and 'What is usually taught at that grade level?' to 'What concepts has this child mastered?' and 'What should this child learn next?'"

> "Attention to the child rather than to the classroom resulted in a reorganization of the drill-and-practice material in elementary-school mathematics into ungraded strands. The student, working on several strands simultaneously, begins at the bottom of a strand and moves upward on each strand as a function of his ability to perform correctly on that strand. Since movement along a strand depends on the student, the level of performance on other strands creates a problem set for one student different from the problem set for another student. Thus, unlike in the traditional classroom, each student is solving a different set of problems, and each set of problems contains problem types from each strand appropriate to the ability level of the student involved."(23:26)

(b) Montgomery County Public Schools, Maryland

Montgomery County is a suburban area near Washington, D.C. of 500 square miles with 197 schools and a student population of 128,000. In 1958, with a U.S. Office of Education grant, they started Research into Feasibility of Learnings Employing Computer Technology (Project REFLECT). The project now involves 1,400 students in one elementary, one junior high school, and one senior high school. Subject areas include mathematics, industrial arts, history, French, reading, English, science and teacher education.

Objectives of the project are:

(i) Identification, within the K-12 curriculum design, of instructional elements appropriate for implementation by CAI;

(ii) Assessment of the applicability of CAI materials produced outside the schools for implementing the program of instruction of the school system;

(iii) Production of a limited number of "modular instructional packages" for use in CAI set-up, programmed for flexibility in mode of presentation to meet the needs of individual learners within the overall curriculum design of the schools;

(iv) Actual participation by students in the use of CAI equipment and materials as part of the curriculum;

(v) Determination of the feasibility of using CAI facilities for testing and test development;

(vi) Determination of relative efficiency and effectiveness of CAI in the learning process; and

(vii) Determination of the use of CAI in diagnosing the development status of learners and their needs.(25)

The June 1971 Report succinctly describes the nature of the project: "Modular instructional packages, consisting of computer-assisted instruction programs with associated equipment and materials for experiences leading to the attainment of specific behavioral objectives, are basically of a single concept type. No attempt has been made to develop entire units or courses or to fill specific time allocations. Segments designed employ a variety of the presently known CAI techniques of drill and practice simulation, remote computing, testing, tutorial dialogue, and combinations of these. Some segments include attempts to extend these techniques and develop new ones. Modular instructional packages with strategies for various student target populations, including some which feature learner control of sequence and duration, have been developed. Data collected from the use of validated segments is being used in identification of the role of computer-assisted instruction in an individualized learning system."(25:19)

Storage units, input-output devices, a central control complex, and a station control are used with student stations in the IBM 1500 Instructional System employed in Project REFLECT. Students use instructional stations connected by cable to the computer and its peripheral equipment. Instructional terminals, as the student stations are called, consist of one or more of these components: instructional display with keyboard and light pen, image projector, audio equipment, and typewriter unit.

Experienced classroom teachers develop and adapt materials for use in the CAI project. Teachers involved in the project are provided with staff development opportunities. A team usually consists of a teacher specialist and a number of supporting teachers who devote 10% of their time to the CAI project and the rest to regular classroom teaching. Specialized personnel such as programmers are employed to convert the authored materials into machine-usable form.

In the Montgomery County experiment, CAI is considered but one component of a more comprehensive individualized multi-media learning system design. Teachers involved in the experiment have found that their role changes. They tend to depend upon the computer to provide diagnosis, drills and tutorial materials and to aid them in monitoring student progress. Teachers are also relieved of diagnostic and criterion reference testing and grading and much record-keeping. In mathematics, the teachers are also relieved of much of the time previously required to write problems and grade practice work.

Because CAI is "additive" in Montgomery County, it tends to increase the cost of instruction. The Project Managers estimate that, if students used the computer one-half hour per week, it would add approximately 10% to the per pupil cost of education. Because of this, they recommend that, even though CAI is effective, it should presently be used only when (1) increased achievement cannot be realized without it, (2) larger class sizes can offset some of the costs of computer hardware, or (3) no other method of providing the instruction is available.

(c) Chicago, Illinois, Public Schools

In 1971, CAI was introduced into seven elementary schools in Chicago. By the fall of 1973, 26 schools were involved and the number will grow to 32 by February, 1974. The purpose was not to replace teachers but to cope with a rising teacher/pupil ratio, to personalize instruction, and to extend teacher effectiveness. The first seven schools chosen were from the poorest economic areas of the city where reading achievement was one year below grade level or more.

Three curricula are currently in use: mathematics, grades 1-6; reading, 2-6; language arts, 3-7. The programs are adapted for the Chicago hardware from the materials developed by the Computer Curriculum Corporation of Palo Alto, California, a firm in which Professor Suppes has played a major role. The curricula are organized in strands so that student needs can be met. The reading strands, for example, include word attack, vocabulary, literal comprehension, interpretative comprehension, and work study skills.

In the Chicago schools, there is a CAI room where the display terminals are used by students. A para-professional supervises the CAI room and instructs pupils in the operation of the terminals as needed. There are half as many of the terminals as there are students because each student uses a terminal 10 minutes per class period in two of the three curricula or a total of 20 minutes. This is considered about maximum student endurance and in ten minutes a student gets five times as much practice as he would get using a textbook or workbook.

When a student sits down at a terminal, he simply types out his identification number, his last name, and the first letter of the curriculum from which he needs a lesson. The computer replies, on the screen, "Thank you, Johnny", using his first name for verification and personalization. And the lesson begins. The central computer instantly selects the proper starting place for the lesson -- determined by the student's achievement level and needs, already in the computer's memory. Drill and practice is the method used. The computer makes assignments, checks the response for accuracy, evaluates the student's potential for the next sequence of complexity, and then assigns the next sequence. Students who do poorly on one sequence might be branched into a remedial sequence, while those who do well are also branched into a more difficult sequence. Materials are always designed to give students the practice they need to meet the objectives of the course.

A UNIVAC 418-111 computer is used in Chicago. It is connected to UNISCOPE display terminals in the schools using telephone lines for linkage to the central system. There is currently no audio component in order to keep the cost at a minimal level. The system now in operation could handle 70,000 pupil sessions weekly and could be available for community use after school hours. Teachers receive daily class "hard-copy" reports on each student and periodic gain reports from the CAI system. These enable teachers to monitor student progress, provide individual tutoring as needed, and plan more effectively the class activities.

Results for the first year have been published (see Appendix I); those for the second year have not been released as of the writing of this paper[*]. Educators in the Chicago school system are pleased with student and teacher reaction and with the results as shown on the standardized achievement tests. As a concrete example, absenteeism has been reduced 13%. The Chicago schools plan to extend the CAI service to include tutorial lessons, prepared by teachers and subject matter specialists, which would teach concepts as well as reinforce them.

Amortized over a ten-year period, capital outlay and annual operating costs total $76.25 per student for each curricular area. If a monetary value were put on the decreased need for remedial teachers and on the fewer teachers required because of reduced student failure resulting in repeating grades, the CAI system could easily be viewed as cost effective.

3. Multi-Media Usage - Kirkwood Community College, Cedar Rapids, Iowa

This case involves the use of video-tapes, data processing equipment, and concrete objects in the teaching of welding at the post-secondary or trade school level. Video taped demonstrations were employed so that repeat demonstrations, so common in conventional welding classes, would not consume valuable instructor time. That released time could then be used for attention to individuals as they progressed through the two basic learning units. These units, Basic Arc Welding and Heavy Industrial Welding, were divided into eleven modules. A student was required to complete distinct steps in each of the modules, demonstrating proficiency in the skill contained in that step, and in addition, passing a written test before being certified to move to the next modular level.

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[*] According to a telephone conversation with an individual in the Chicago schools, the standardized test scores are still being processed and will not be available to December 1973. They expect results to be better than in the first year (as shown in Appendix I) because both students and teachers have become familiar with the procedure and many of the technological problems were solved which in the first year interrupted the computer lessons.

A report of the project describes the unique way of tracking student progress:

> A progress chart was visible in the shop and recorded the level at which each student was working. In addition, the time each student spent in the shop and his attainment level was recorded daily on the individual student's class card. The cooperation of Data Processing then made possible a weekly printout updating the instructors' information about each student's progress and time spent in each step of each module. The instructors used this report as a check to see that any student who spent a longer than average time on any step received additional individualized attention.

Four variables were examined during the project and the results were compared to control groups using conventional methods. On the first variable, student-time-consumption, those in the project took considerably less time to achieve the objective of learning to weld -- 190 hours compared with 261 in one control group and 233 in another. On a second variable, dropout rate, this was significantly lower (.05 level) for the experimental group than for the two control groups. On an attitude questionnaire, students reported sufficient individual attention was provided; 93% felt the experimental method made such individual attention much more possible than in conventional settings. Per student cost to the institution was $105.97 for the experimental group, $203.74 for one of the control groups operating in a conventional manner, and $183.25 in the second control group. A report of the project provides a typical conclusion about high initial costs on many innovative activities:

> The cost analysis reported here and earlier included the income through tuition, the cost of gas, rods, steel, instructors' salaries, and administration. However, it did not include the cost of putting the demonstrations on videotape or the cost of the receivers necessary to show them. It was assumed that sufficient savings on the variables present in all

comparable quarters would allow for recovery over a period of time of the capital outlay required for the experimental presentation method.(4:16)

4. System with Minimal Use of A.V. - Individually Prescribed Instruction (IPI)

IPI is officially defined as "a system of managing instruction so that each child's work can be evaluated daily and so teachers can make assignments for each child which are tailored especially for him. It is a technologically-based system which places heavy emphasis on the process aspect of technology and relatively little use of audio-visual materials themselves."(6:27) IPI began in 1964 as an experimental and developmental project in one school. It has developed and spread until in 1972-73 86,842 students in 40 states were learning with IPI programs in mathematics. (Data on the number of students in the reading and science programs were not available).

IPI is a diagnosis/prescription system which depends upon sequenced instructional objectives, each of which is expressed in behavioral terms. Pupils proceed independently with a minimum of teacher instruction, the teacher using their time for diagnosis of pupil needs and the writing of prescriptions. The chart on the following page illustrates how the system operates.(6:29)

The teacher spends his time in evaluating progress of individual students, diagnosing needs, preparing individual learning prescriptions, and in tutoring individuals. The system itself provides many materials for use of teachers in individualizing the prescriptions, but since student needs vary greatly, the teacher plays an important role in making the system operate effectively. Teacher aides are essential to aid in scoring student work, recording results, and in organizing and dispensing the instructional materials.

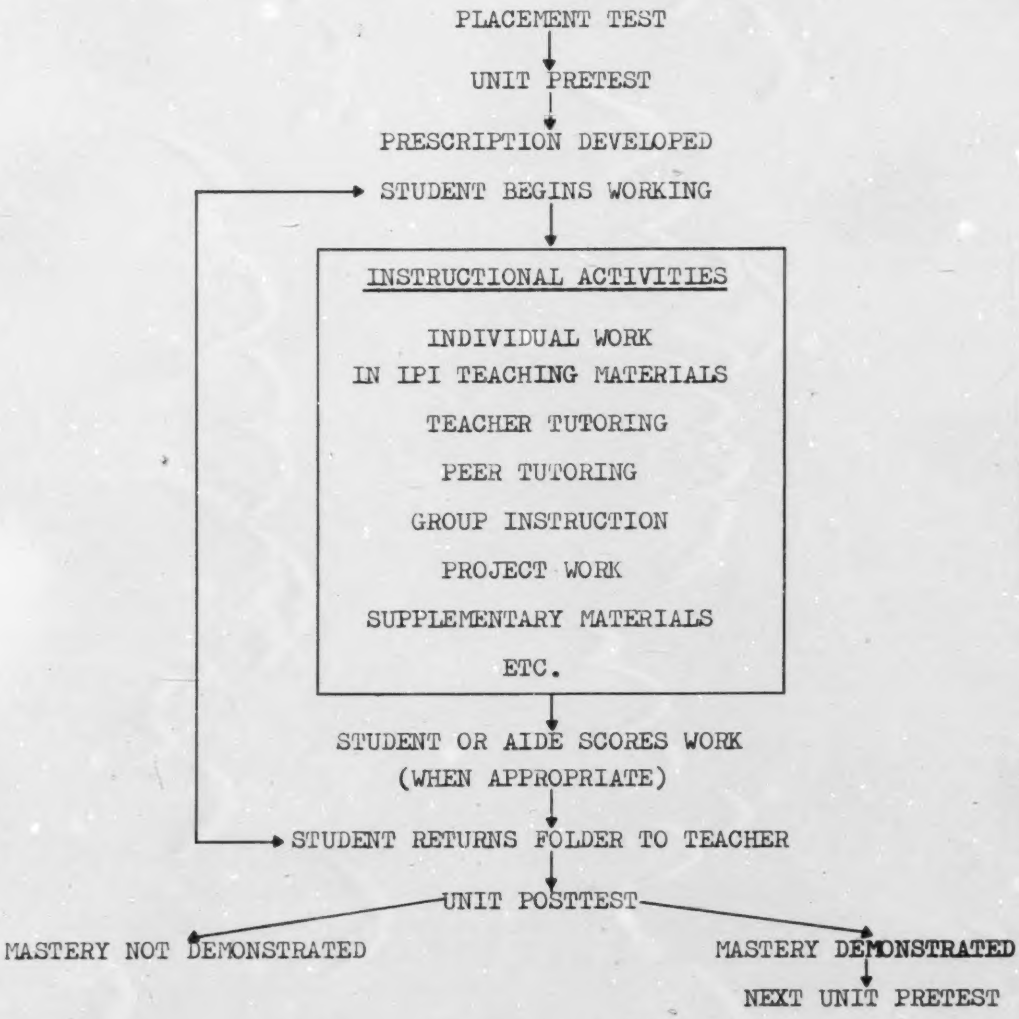
The prescription sheet is the communication link between the pupil and the teacher since it indicates the resources that can be used in obtaining mastery of the objective. There is a heavy use of worksheets, but in some programs such as reading, there is also use of audio materials, self-instructional readers, story books, and response sheets.

Research data indicates that students achieve as well or better, even ones measured on standard tests, as do students in other classrooms. The IPI system has been tested with effective results on several minority populations. James Becker, who was instrumental in the development of IPI, claims:

> "...IPI technology will be able to reduce what is being currently conducted during the whole school day to mush less time. It will be possible to let children learn many of the basic skill subjects anytime during the day. We are hypothesizing that the typical school day can be reduced to one-quarter of the time now spent on these things. This leaves a school day in which we can begin to do many exciting things."(6:36)

Currently, the use of IPI is more expensive than a conventional elementary school program, but the costs are gradually being reduced.

IPI STUDENT ACTIVITIES


PLACEMENT TEST
UNIT PRETEST
PRESCRIPTION DEVELOPED
STUDENT BEGINS WORKING
INSTRUCTIONAL ACTIVITIES
INDIVIDUAL WORK IN IPI TEACHING MATERIALS
TEACHER TUTORING
PEER TUTORING
GROUP INSTRUCTION
PROJECT WORK
SUPPLEMENTARY MATERIALS
ETC.
STUDENT OR AIDE SCORES WORK (WHEN APPROPRIATE)
STUDENT RETURNS FOLDER TO TEACHER
UNIT POSTTEST
MASTERY NOT DEMONSTRATED
MASTERY DEMONSTRATED
NEXT UNIT PRETEST

C. Open Learning Plans

Several attempts to be more flexible and open are now underway in several U.S. schools. These attempts range from opening up the dimension of *time*, to the creation of *freer learning environments*, to new *places* and *ways* to learn. Four examples are included here which relate to staffing patterns.

1. Year-Round Schools

There is a growing movement towards schools that are open for longer periods of time than the usual nine months, even though students would not necessarily attend for longer periods than now. The motivation is primarily economic: why build and maintain an expensive structure and use it only half of the time[*]? Often, though, another objective is to capitalize on more normal learning patterns by having students away from formal learning tasks for shorter periods of time than the usual two months.

There are at least three kinds of plans. In the first are those in which a portion of the student body is always on vacation. These include the "45/15" plan, the "staggered quarter" arrangement, and the non-voluntary "trimester" plan. In plans such as these the students are in some ways divided into groups (place of residence, age, type of curriculum desired, family choice, or randomly) and formed into student bodies. In the 45/15 plan groups "A", "B", "C", attend school for 9 weeks while for the first 3 of those weeks "D" group vacations. "D" returns to school with "A" and "B" and it is now "C's" vacation. And so the cycle goes with 25% of the youngsters always out. The primary motivation in such plans is economic -- the school building and other capital outlays have to be built for only 75% of those to be served at any given time. In addition, these plans offer many of the same curricular and instructional advantages as those year-round school arrangements instituted for other than economic purposes described in the next two cases.

A second kind of year-round school plan are those designed to promote individualization of the school program. These include the "Multiple Trails Plan", the Clarion(PA.) College Model developed by John McLain (35) and the "Quinmester" Plan. In these arrangements the variable of time has been manipulated to allow for more attention to such factors as classes with reduced scope of subject matter, bringing about greater intensity and depth, because of fewer classes - opportunity to concentrate on 3 or 4 classes instead of 6 or 7, curricular sampling, curricular and instructional experimentation, and reducing the effects of failure by decreasing the investment of time for students, i.e. shorter semesters.

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[*] Some make a more dramatic argument: there are 8,760 hours in a year; school is in session 1,080 hours, therefore we use our school buildings only 12% of the time. This is, of course, ridiculous - very few buildings, public or private, are open for more than 1/3 of the time.

The third category of year-round schools includes those that allow and sometimes promote accelerated school finishing. The "Modified Summer School" Plan, the voluntary "Trimester" Plan, and the "Continuous School Year" Plan are examples. In the latter a 210-day elementary school calendar is proposed which permits completion of seven grades (Kindergarten through Sixth) in six years. Others of this kind allow students to opt for an additional time block either for enrichment or to finish school faster.

Preliminary observations are that most experiments with year-round schools have produced little actual savings and that teaching roles or staffing patterns have not been significantly affected by the innovation. Such generalizations, though, are premature because there are at least three developments that cause optimism. It appears that the 45/15 plan in Valley View School District, Illinois, and in other sites is working to the satisfaction of students, parents and teachers and is taking place in buildings and with equipment designed for only 75% of the student body.

There is reason to believe that the plan would work well in other communities with similar attributes. Secondly, in the Clarion College demonstration planned for several years and now getting underway there is cause (because of the care that went into the planning and the resources available) to look for curricular experimentation, with an emphasis on matching curriculum to student need. The third development that shows promise is in Dade County, Florida, Public Schools and other sites working with the Quinmester Plan -- again not for the economic implications but for outcomes in terms of staffing patterns and general instructional and curricular improvement. Appendix II shows a comparison of the various year-round school plans.

2. Informal Education

The United States is experiencing a renewal of the progressive education movement of pre-World War II days. "Open schools", "flexible education", "informal education", are words typically used to describe new programs related to that thrust. Its historic roots are from Rousseau, Dewey, Montessori, and Sir Henry Hadow, author of the British Report which began the informal movement in the country in 1924; today's movement has taken the strands begun by those philosophers and practitioners and added to them the work of several learning theorists, most notably Jean Piaget; curriculum innovators such as Jerome Bruner and others; and observers of the larger social scene who could bring public and intellectual support to the movement - Charles Silberman, Joseph Featherstone, Lady Bridgit Plowden, and others.

The most notable experiment in bringing about widespread use of open education in the United States has been the state-wide program in North Dakota. This program is based on a massive teacher re-education effort designed to change the way in which schooling is conducted, and to upgrade the formal education of teachers. Accomplishments include higher attendance levels, decrease in discipline problems, increased student interest, and gains in reading, math, science.(9:15)

Other approaches at the elementary level include the John Carey School in Richmond, Virginia, where the type of schooling provided is based on age characteristics with the amount of freedom governed by age and readiness levels; those in Dallas, Texas, characterized by their open resource center in the middle of the building with books, audiovisual material, and home-like surroundings; and the World of Inquiry School in Rochester, New York, where the curriculum is pursued in an informal, culturally balanced setting using a form of the core curriculum approach. There are several high schools in the U.S. maintaining somewhat the same objectives as other schools but trying to be more effective by providing an informal setting. John Dewey High School in New York City, for example, has most of its academic program in mini courses in which students can progress as fast as they are able. With the remaining time they are able to pursue their interests in independent study or in other informal ways.

The objectives of informal education discussed here are essentially those of traditional schools-skill development, citizenship education improving abilities to communicate, developing competency in and regard for the arts, and helping students become life-long learners - although in the informal school there is often more attention given to the latter. The chief differences of informal schools is the organization of the classroom, the learning activities provided for students, the sequencing (or non-sequencing) of the curriculum and the role of the teacher. The nature of these differences can be summed up by Silberman's recall of a Chinese proverb: "I hear, I forget; I see, I remember; I do, I learn".

There is a marked difference in the appearance of an informal classroom from that of the formal one. Pupil desks are replaced by tables large enough for the group work of several students or for the large project activity of an individual: children work independently or in small groups, many of them exploring various learning centers around the room;

the teacher's desk is unobtrusively placed in one corner; there are materials - books, different sizes of paper, science equipment, art supplies - everywhere; and the children are freely talking to others as they engage in their work. The activities of the students range from independent work on various skill development exercises to large group work designed by the teacher to develop a concept in social studies or to promote a kind of artistic expression.

Less attention is given in the informal classroom to curricular sequencing; more to developmental growth patterns of individuals with special attention to the various stages of readiness each has for a given curricular objective. Teacher's role, then, becomes one of diagnosing of individual learning needs; selector and arranger (often with the student) of ways to acquire the new learning; and record keeper, evaluator of each student's progress. The teacher seldom lectures or plans learning opportunities for whole groups. He would never establish groups of youngsters on a long term basis. Instead, small groups of students would be brought together and taught a commonly needed skill such as a kind of punctuation. At other times, children would meet together who had a common interest such as doing a mural painting or writing an original play.

Informal education of this kind discussed here costs no more or less than more traditional forms of school. There are no special considerations that cause it to be more expensive. Also, there is no evidence that buildings built specially for informal education costs more than traditional "egg crate" ones. (As a matter of fact, in Dallas, Texas, schools built for open education have cost $20 per square foot, while traditional ones have cost $25). Most informal classrooms use more expendable instructional materials than the typical classrooms. There can be balancing savings, though, since materials such as workbooks or class-size collections of textbooks would not be appropriate purchases for an informal classroom. Many informal classrooms have aides but their costs, too, are often balanced out by larger class size.

3. Schools Without Walls

Growing from the same traditions as informal education is a relatively new phenomenon on the American educational scene, schooling without a building. The intent of this movement is to bring about significant and basic changes in the way in which school is conducted. A significant change proposed by the proponents of this form of schooling is the source of educational objective - the student himself. In many of these schools, students are trusted to make their own decisions about the kind of education they wish to receive and the way in which they will acquire it.

In Philadelphia's now famous Parkway Program, students made the first and most basic decision, whether or not to attend this school. After that, the student must choose everything he does within the program. If he does not make a choice or cannot make a choice, then nothing happens until he does. Through a system such as this students learn, with the help of advisors, to make decisions - hopefully with increasing skill - and to understand the process through which one goes to make such decisions. In the case of Parkway, there is a rich variety of choices available to the students, for he has the whole city from which to choose his teachers and his curriculum. If he wants to study journalism he does so at the metropolitan newspaper; if he wants to be an artist, he works in an art museum; if he wants to learn a business the staff of the school will help him to find an appropriate resource. In short, Parkway created a learning community with its structure being provided by student choice and tutorial groups. These tutorial groups, consisting of approximately sixteen students who met for a few hours a week with a faculty member, provided personal encouragement, support and counselling, and a place where special attention could be paid to the basic skills of language and mathematics.

Parkway had over a hundred cooperating agencies. Some of them were the Academy of Natural Sciences, the Atlantic Richfield Company, the Convention and Tourist Bureau, the Film Media Center, the Hahnemann Medical College and Hospital, the Insurance Company of North America, Perfect Copy Service, Inc.; Philadelphia Museum of Art, Philadelphia Music Academy, Philadelphia Zoo, Wanamaker Department Store, and the Weinstein Geriatrics Center. In fiscal year 1970-71 the Parkway School ran on an annual per student cost of $720 - about the average cost per student in Philadelphia for that year. Other schools however have costs not reflected in that average - primarily the school building itself. That cost, according to estimates in 1971, for a two-thousand student building in Philadelphia would have been twenty million dollars; but since the amount would have to be borrowed, it would have actually cost the taxpayers forty million dollars. Also, these figures do not include heating and maintenance, which in Philadelphia cost about $100 per student per year. Parkway used virtually none of this money since it had little space to maintain and operate. Attendance during 1971 was at 89 per cent somewhat higher than the usual rate of attendance in Philadelphia high schools. (Although this figure may not be very reliable because of the nature of attendance keeping procedures at Parkway.)*

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*These data are taken from The School Without Walls, bibliographic entry 68.

Obviously, there is a tremendous difference in the tasks of the teacher in a setting such as this. He must, as required, help students articulate their needs. On other occasions, the teacher acts as a guide to those resources which help students meet their needs - sometimes filling that need himself but often finding other sources of help. And the teacher must also be an independent observer of the student, acting as a friendly critic and counselor for the future. In at least two experiments conducted in the United States, the Parkway Program in Philadelphia and the Home Base School in Watertown, Massachusetts, there is firm evidence that pupil achievement as measured by the usual methodology either remains constant in these freer schools or is improved. This is particularly true when one looks at the success that Parkway has had with former dropout students. On other measures, such as student interest in school, feelings of satisfaction, and desire to pursue more advanced education, there is very strong evidence that the efforts of those who would open up the school environment are being successful.

4. An Open Learning System on Television

In the Fall of 1969 a television show designed to systematically develop young (3-5 year olds) children's readiness for reading appeared in the United States. "Sesame Street", in 1972, was being viewed by nine million children. A total of 130 hours of instruction was prepared at a rate of less than 1/2 cent per student hour. Longitudinal research has shown that television can be an effective medium for teaching important simple facts and skills, such as recognizing and labelling letters and numerals, and more complex higher cognitive skills, such as classifying and sorting by a variety of criteria. An important finding of the preliminary research was that the program did not require formal adult supervision in order for children to achieve the program's objectives. Since most of the youngsters who viewed the program were pre-school age, this finding has led many to seek greater use of the television medium for direct instructional experience outside the school building.

Children's Television Workshop, producers of "Sesame Street", in 1971 put "Electric Company" on the air for young school age children - especially those with reading problems. In its first year four million youngsters viewed the show (2 million in school, 2 million after school) and in its second year six million students participated. Again, per pupil expenditures per hour of instruction are very low because of the tremendously large viewing group(13).

Extensive research indicates that in the 19 curricular areas in which the show worked viewers scored significantly higher on standardized achievement test (appropriately called 'The Electric Battery') than did non-viewers. These gains were not restricted to the target population in the lower grades (higher grade youngsters insisted on seeing the show, too). Fourth graders, for example, gained significantly in their ability to punctuate. The teacher's role in the classroom in which Electric Company is used is one of preparing youngsters in advance for the exercise they will have with the show and doing follow-up with new learnings after it is over. Materials are available to help the teacher.

III. CONCLUSIONS AND IMPLICATIONS

The principal method used to try to improve school quality in the quarter century following World War II has been to reduce the number of students which teachers meet each day. For example, the student/teacher ratio in elementary schools in 1955 was 30.2 as compared with 24.4 in 1972; for secondary schools, the student/teacher ratio in 1955 was 20.9 as compared with 18.9 in 1972. Since teacher salaries constitute the largest single budget item (approximately 75%), it is increasingly difficult to bring about school improvement in this manner. In a medium size school district of 50,000 students it would cost 1/2 million dollars in salaries per year to reduce *each class* by one pupil; in a large district it would, obviously, cost millions. In the United States, where school costs have risen much faster than the Gross National Product, it is almost impossible to get approval for such an investment even if all data supported the addition.

There is an interest in higher productivity in education, but the search for ways of achieving this has altered in the past decade. As the selected innovations reviewed in Part II make apparent, the focus now is not on increasing *student/teacher ratios* or on cost-effectiveness *per se* but rather on improving the quality and effectiveness of education at the same or at moderately increased costs. This is caused by a number of societal factors. The USA has moved from a time when there was a shortage of teachers to an oversupply (given our present staffing and use patterns); from weak teachers' organizations to very powerful ones interested in protecting members from a labor point of view; from relatively big federal support of innovative practices to very little federal support; from experiences with innovations that were expected to become widespread if they proved desirable to the concept of alternative schools or a variety of offerings to the public; from the goal of raising the general quality of education, particularly as it pertained to factual information, to a concern with more humanistic values such as cultural identity, equalization of opportunity for minorities, individualization of instruction, and socialization techniques.

In order to help clarify the distinctions and features of the innovations described in this paper, the authors have developed a table which, in a generalized way, compares several innovations on four variables (See Table 5). A study of the chart reveals that the first decision needed when considering installing an innovation is one of purpose: Are the present goals and objectives acceptable? Are new ones to be substitutes? Are new ones to be added on? Is the total school population to be affected or only a particular segment? Must the innovation be achieved without increasing costs or can the "value added" be financed through increased costs? An innovation may fit some conditions but not others. Conceptualizing school problems and building solutions that match needs is the important first step in improving educational quality. The table of comparisons is a rough first attempt to demonstrate that the "innovation pharmacy" is not empty, that we can begin to correct school problems more rationally by selecting appropriately from the growing number of tested options - particularly when we are better able to match *problem* and *solution*.

A. Conclusions

The authors believe that the innovations reported and others studied in the preparation of this paper would support the following conclusions:

- Reducing class size does not necessarily improve learning results; some goals can be achieved as well as in large group situations as in smaller ones -- although not all goals.

- There are often less expensive ways of increasing educational effectiveness than by reducing teacher/student ratios, especially when class sizes reach a mean size of 26 to 30 students. Educational Turnkey has made an interesting study concerning how much of 25 types of resources would have to be changed in order to affect a 1% change in the school district budget (See Appendix III). The most expensive change is to reduce the pupil/teacher ratio, with changing teacher salary being almost as expensive. On the other hand, increasing expenditures for such items as instructional materials and equipment has little relative effect on the budget.

- When innovations are installed, they tend to change goals and the basis for determining quality rather than to bring about improved ways

TABLE 5

Comparison of Fourteen Innovations on Four Variables

Innovation Described	Differences in Educational Objectives	Differences in Instructional Strategies, Teacher Tasks & Staffing Patterns	Resource -- Differences in Use of Technology	Costs	
				Capital	Operating
3 on 2 in Hawaii.	Much the same as in a traditional school and added to it a greater opportunity to strengthen the language program.	Team planning. More individual teacher contact with students, large group instruction.	Some use of overhead projector and other devices for large group instruction -- other than that no significant differences.	Higher initial cost--normal after	Higher
Individually Guided Education (IGE).	Expanded to include work in pre-reading, environment, other objectives remain as is.	"Diagnosing" and "prescribing" functions more necessary to the program; planning for instruction legitimized; senior people have school-wide curriculum development responsibilities; differentiation in staffing.	Mini-courses in some curriculum areas are a part of the system.	Not necessarily higher	Slightly higher
Team Teaching; NASSP Model Schools Project.	On-going curriculum revision necessary to model; fewer required studies; more opportunity for student selection.	Individualization; more independent study; opportunity to vary instruction by manipulating class size; task differentiation in staff; lighter student contact load; more planning time; use of non-professionals.	Increased use -- especially by students.	Same after initial remodeling	Same
Differentiated staffing: Temple City, California.	Same as traditional schools.	Teacher tasks based on analysis; pay related to responsibilities; vertical differentiation; use of non-certified staff.	Same as traditional schools.	No change after initial remodeling	Higher
Vertical Differentiated Staffing: Mesa (Arizona) Model.	Much the same as in the traditional school.	System problem-solving model: needs identification, strategy development and implementation, evaluation; teachers become managers of instruction; internal performance contracts (bidding); vertical hierarchy but not a permanent one (fluid)	Teacher control of resources acquired	Not available at this time	Not available at this time
Closed Circuit Television - Washington County, Md.	None except some subject areas covered which were not previously available to students.	Some large group TV viewing; less "presentation" of classroom teacher; the TV system and the classroom become a team and the studio teacher and the classroom teacher also become a team.	Closed circuit television and a media resource center required to install this innovation.	High initial cost.	Same -- lower if additional subject areas considered.
Computer-Assisted Instruction - Montgomery County, Md. Public Schools	Same as traditional schools.	Reliance on computer for diagnosis, drills, some tutorial work, and monitoring of student progress; programmers added to staff.	Modular segments of computer-assisted instruction.	Increased 10%	Higher
Computer-Assisted Instruction - Chicago, Ill. Public Schools	Same, except greater emphasis on helping culturally-different non-achieving pupils	Use of computer for diagnosis, drill, and practice in three elementary subject areas; use of daily student progress reports from computer to develop student classroom programs; paraprofessional runs computer room.	Computer-assisted instruction 10 to 20 minutes per student in three curricular areas	$30 per student year per curricular area higher	$70 per student year per curriculum

Computer-Assisted Instruction - Kirkwood Community College.	Same - competency in welding.	Learner-centered modular learning units; interaction with students on individual basis as required; fewer teachers required.	Video-taped demonstrations, data processing	Higher during initial period of time	Lower
Individualized Prescribed Instruction (IPI).	Purpose is to individualize instruction - curriculum content little changed.	Implementation of an instructional system. Teacher tasks include an emphasis on diagnosis and prescription, selecting and preparing learning materials, and managing instruction; aides are added to the typical staffing pattern.	Programmed materials used; some AV materials and equipment in some subject areas but otherwise minimal.	Not applicable	Higher because of cost of materials
Year-Round Schools.	Usually the same as traditional schools.	Strategies and tasks remain essentially the same as regularly-scheduled schools, often staffing pattern is affected because of different lengths of teacher contracts - some can work the usual 180-day school year while others can work a full twelve months.	Not necessarily different than traditional schools.	Usually lower	Usually lower
Informal Education.	Generally the same as in other schools, but in some greater emphasis on affective education.	Greater amount of individualization and pupil determination of tasks, more flexibility, often aides - particularly volunteers.	Not necessarily different than another kind of school.	Sometimes higher initially	Not necessarily higher
Schools Without Walls.	Greater attention to helping student determine own ends, attention given to such processes as decision-making, values, clarification, and learning how to learn.	Program is almost totally individualized, although in some places small groups are formed for single-need purposes; teacher is a counselor, guide, seldom a giver of information; many more kinds of teachers including people in the community who other have other employment and who help youngsters on an "apprenctice" basis.	Much greater use of technology since, depending on what is available in the local community and in the places with which the school has access.	Lower	Not necessarily higher
An Open Learning System Using Television (Sesame Street and The Electric Company.)	Greater attention to getting students to care about learning and to help them catch up if they are behind in fundamental skills.	Most known instructional strategies employed; teacher is purveyor of information or the causer of inquiry; professional actors become teachers.	Television in the home and in the school and also some use of material to accompany the television programs widely distributed.	High for regular broadcasting. Program preparation high initially, decreasing as the supply of programs is built.	Very low per pupil expenditure

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of achieving current goals and objectives. For example, an effort to reduce the failure rate might instead, or in addition to, bring about individualized instruction or a more humanized curriculum. Innovators should anticipate that the schools have a way of taking innovations on and changing them in unanticipated ways.

- The initial cost of an innovation tends to be higher than what can be expected once the innovation has been established. Studies of the introduction of computer-assisted instruction, individually-prescribed instruction, informal education, differentiated staffing all show that there are costs connected with minor remodeling; the purchase, lease, or preparation of materials; in-service education costs; consultant services, and the like. One surprising factor, at least to the authors, was the comparatively small amount spent upon upgrading teacher competencies when innovations are introduced. One study made by the U.S. Office of Education relative to a differentiated staffing innovation showed that about the same amount is spent on in-service training as on teacher substitute pay and much less than on para-professional fees.

- There is a tendency, when innovations are introduced to hire additional personnel already possessing new skills rather than to retrain the current staff and reassign them to new functions.

- In the United States, there is more interest in and acceptance of the concept of increased teacher productivity and improved working conditions for teachers than in reducing the student/teacher ratio.

- Inherent in many of the innovations are the beginning steps towards more effective staff utilization although this has usually not been stated as a primary goal of the innovation. For example, the IGE program, with its curricular development and instructional delivery system, is causing greater attention to be paid to discrete teaching tasks and that attention to basic considerations about teaching and learning will bring about more efficient staff utilization.

- Innovations may benefit the schools in important but indirect ways such as raising the level of student motivation, reducing the failure rate of students, thereby decreasing the need for reteaching, remedial teachers, saving student time, improving student attendance in school.

- Innovations such as those described here have increased the number and complexity of instructional decisions. Time and training need to be provided for teachers as they make more of the basic instructional decisions. Fortunately, this new decision-making responsibility is coupled with the recognized need for learners to have an increasing independence and to not be so closely supervised, at least by certified teachers.

B. Implications For Policy

The authors of the paper believe that there is inherent in the U.S. experience with innovations, particularly those affecting staff utilization, some valid implications for policy.

(a) Use of Teacher Aides to Perform Non-Instructional Tasks

By non-instructional tasks is usually meant such assignments as playground supervision, monitoring study halls, athletic events, and social events; filling out forms and reports, typing tests, and reproducing these, inventory supplies and the like. Studies vary in the amount of non-instructional time which teachers put in, but in all of them it is a sizeable amount. For example, in a recent study done by Gerald Krunbein (30:305-329) of high school teachers in California, it was shown that approximately one-fourth of the teacher's total time was spent executing non-instructional tasks. On an average yearly salary of $11,318, this meant that the per teacher cost of non-instructional tasks per year was $2,877.99. It is obvious that even if para-professionals were paid as much as five dollars per hour, some savings could be made in salaries and it is reasonable to assume that some of the non-instructional tasks could be performed by people paid as well as two dollars per hour. Many of the non-instructional duties, when performed by teachers, require the payment of extra compensation about the contracted salary. Over one-third of the teacher collective bargaining agreements on file with the NEA Research Division contain provisions granting extra compensation for a variety of extra duty assignments. This tends to push the cost even higher for handling non-instructional tasks with certified teachers.

(b) Criteria for Selecting Appropriate Innovations

After the goals for an innovative practice have been established, it will be found that some kinds of innovations will accomplish the goals much less expensively than others in a given situation (See Appendix III and 24 in Bibliography). Factors that must be considered include: (a) the cost of initiating the innovation; (b) the availability of the materials to support the innovation, and the cost of these; (c) the size of the student population to be served; and (d) the degree of diversity and decentralization within the school system.

In a highly decentralized educational system, it is difficult to implement a large-scale change even though it would prove effective. This is a major reason why such innovations are more difficult to implement in the United States than say in Samoa, El Salvador, or Niger.

Capital intensive innovations are efficient only in large-scale operations where large audiences can be reached, or at least the software has been developed outside the school system so that it is not necessary to add its development to the school operating budget. Examples such as the following will illustrate this point. The cost of ratio ranges from one-third cents to four cents per student per hour. The low end of the scale would require several hundred thousand students whereas the cost for a few thousand would easily reach the higher end of the cost scale. In a comparable way, the cost of instructional television is said to range from 1.5 cents to fifteen cents per student per hour. The low end of the range would require an audience of close to one million students. A rule of thumb for computer-assisted instruction is eighty-five cents per student hour if the terminal is used 2,000 hours per year.

(c) Application of the Middle Management Concept

As has been pointed out, the greatest opportunity for reducing the cost of education would arise from increasing the student to certified teacher ratio. Also as has been pointed out, interpersonal relations tend to suffer as the student/teacher ratio increases. There is a difference of opinion concerning the effect on cognitive learning. Innovations have been undertaken which would tend to decrease the number of certified teachers per student population while increasing the number of non-certified adults in contact with the students. In the NASSP or Trump Plan, the role of the school principal was changed so that a greater percentage of the time could be spent in middle management functions of instruction. This, coupled with horizontal differentiation in the role of certified teachers and the addition of teacher aides resulted in a new staffing pattern. In the Temple City and Mesa differentiated staffing experiments, certified teachers are arranged in a hierarchical pattern so that a middle management function emerges. This pattern can also be seen in the IGE multiunit school where senior teachers take on middle management program functions. Kiesling(18) also supports the notion that the "middle level management" concept holds considerable promise if applied to education.

(d) Better Use of Capital Investments

Improved use of capital investments such as buildings, materials, and equipment could not only affect teacher roles but result in great productivity in and of themselves. We have already seen that the concept of the year-round school has implications for more cost effective use of buildings, equipment, and materials. There is also a possibility for teachers that so desire to increase their annual earnings as well as to provide opportunities for teachers that wish shorter teaching terms than a full year. We need more practical experiences with the schools without walls concept, particularly as it can be adapted and also combined with other ideas such as year-round schools. Another example of the way in which capital investments can change teacher tasks is through the use of the computer to reduce the teacher time required for grading, diagnosis, record-keeping, and the like.

C. Incentives to Schools to Experiment With New Teacher Roles and Staffing Patterns

There are some types of activities which hold promise for encouraging educational institutions and teachers' associations to view experimentation with teacher roles and staffing patterns in a more favorable light. Among the many that could be mentioned are the following:

- Involve teachers and teachers' associations in the planning for innovations. Become more definitive about teacher role in decision-making - insuring its place at the instructional level and at planning stages.

- Providing adequate in-service education and professional development both before the innovation is introduced and during the implementation stage. Emphasize an individualized approach to this kind of teacher career development.

- If adjustments are to be made in the number and/or type of staff employed, make the adjustment by attrition rather than by replacement of those already on the staff.

- Provide funds from outside sources to cover the added cost of initiating innovations. We have found that in the United States very few major innovations are introduced without this stimulation of outside funds. In past years, this has frequently come from the U.S. Office of Education or the private philanthropic foundations. Matching grants are often a good plan, particularly if these are extended a three-to-five year period and diminish so that the total cost of the innovation is covered by the school district by the end of the initial phase.

- The development of expensive software with federal funds provides an incentive to schools; television programs, CAI programs, and the like are exceedingly expensive and none but the largest communities or the wealthiest schools can cover the cost of developing such software in their annual operating budgets.

- Some favorable experience has accrued in the use of performance contracts for teachers within a school system as opposed to the bringing in of an outside industrial firm (sometimes called bidding); also, the use of voucher systems within the public school system has, in the one situation, where this has been tried in the United States, provided an incentive for the provision of alternatives within the school system.

- Innovations which cause teachers to feel more productive and professional have a better chance of success than those which tend not to affect that variable. Examples of favorable innovations might be those that tend "to turn students on", reduce discipline problems, produce the necessity for re-teaching, relieve teacher of non-instructional tasks, and the like. Also, innovations which reduce teacher/student encounter time have a greater chance of success.

D. In Conclusion

Much has been written about the recent criticisms of the schools in the United States and it is true that both the public and the education professionals are desirous of an improved educational program. The criticisms should not be taken, however, as a loss of faith in the schools *per se* or in teachers. A recent Gallup Poll overwhelmingly reports a belief by citizens in the United States that schools are better now than when they attended. Also, respondents listed teachers as one of their "favorite things" about schools. Lack of proper financial support is seen to be a pressing problem, so that one can predict that in the future in the United States, there will be increased interest in productivity in education. In fact, this productivity will be reached not through the hiring of fewer teachers but through efforts to make teachers more productive through the use of non-certified staff, improved middle management concepts, and the use of technology.

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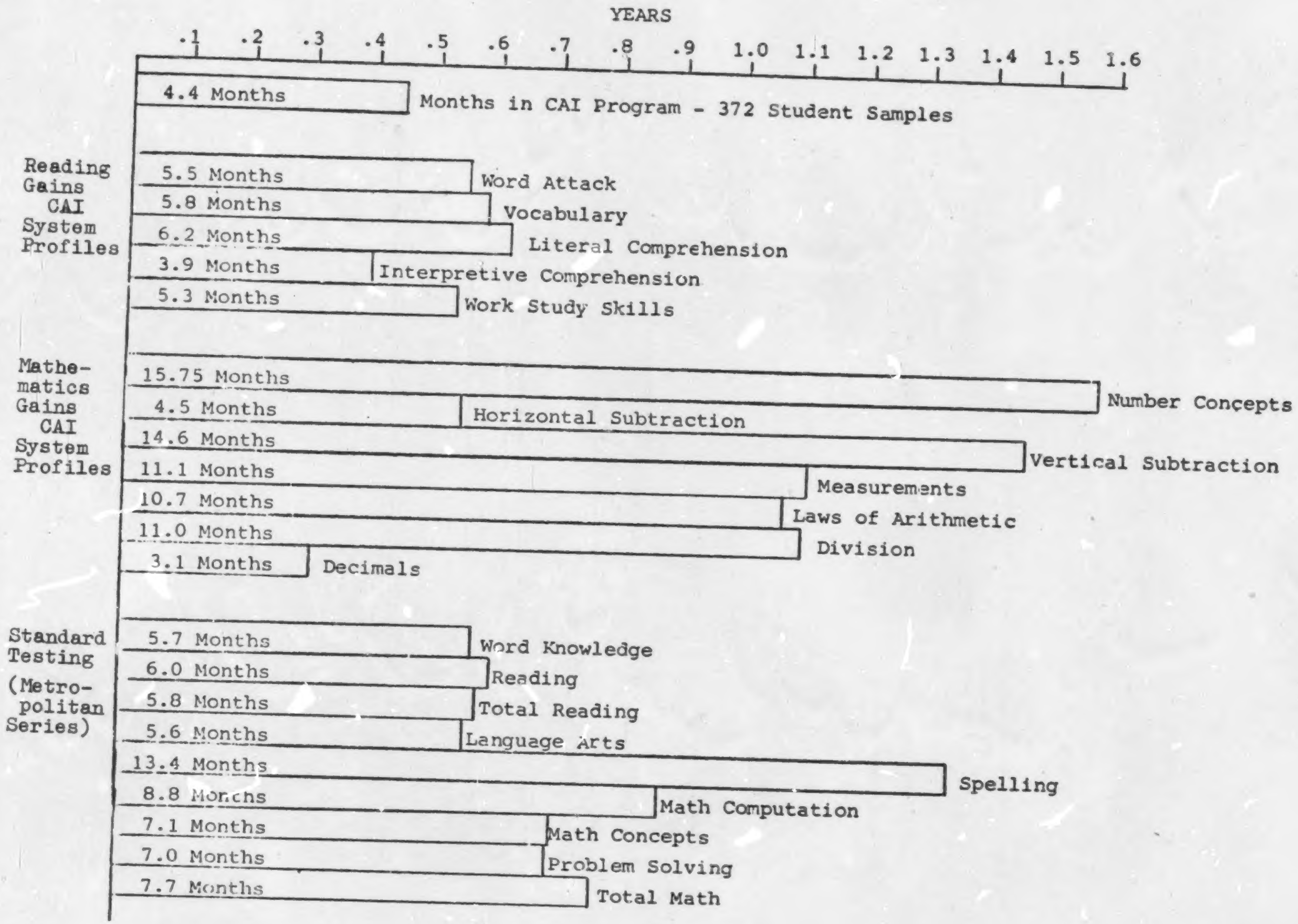
APPENDIX I: STUDENT GAINS - CAI 1971-1972



APPENDIX II: VARIOUS FORMS OF YEAR-ROUND SCHOOLS

Commonly used names of various plans	Treatment of Three Typical Objectives		
	Individualization or other attempts to change instruction or curricula.	Acceleration of student completion of school	Conservation of economic or other resources
45/15	Could lead to improvements because of change of pace, reduction of learning loss over summer, or other factors related to scheduling but this is not primary motivation and there is little hard evidence.	No	Primary Motive- to construct buildings and other capital outlay expenditures at 75% level
Staggered 1/4		No	Teachers, too, can choose length of time to be employed
Trimester (non voluntary)	Calendar is not significantly different from that used now so instruction improvement is not a direct outcome of the plan	No	See above - generally 1/3 of student body out at all times
Trimester (voluntary)	See above but with added complication that some students will be present during the third time block and others will not	Possible	Some savings, depending on the number of students who choose to go to school during third time block
Multiple Trails	School day is divided into time modules of different lengths to accommodate different courses. Aim is a continuous progress school	Yes, although a similar number of students could also take longer than usual	Not a primary consideration although there is no evidence of increased costs
Clarion College	Primary purpose is to improve program through individualization, cross-age groupings, experimentation, and teacher education including in-service		Not primary consideration
Quinmester	Three purposes shape the plan : expanded curriculum because of mini courses, greater opportunity for experimentation, and reducing effects of student failure	Possible	Not primary consideration
Modified Summer School	Summer program for enrichment or remediation is dropped; new one offers semester's work as in regular school setting	Yes	Costs can be higher especially if summer enrollment is low
Continuous School Year	Has as an aim to do away with graded structure and replacing with learning levels	Primary purpose	Can save money by educating more students in the same facility

LEVEL : ELEMENTARY
PROGRAM : ACADEMIC

APPENDIX III: NATIONAL AVERAGE

COST-ED ECONOMIC FACTOR RANKING
EDUCATION TURNKEY SYSTEMS

RANK OF 25	DATA GROUP	COST FACTOR	REFERENCE	COST FACTOR VALUE FOR CHANGE IN COST PER STUDENT YEAR			COST IMPACT RELATION	RELATIVE POWER
				1% SAVINGS	INITIAL VALUE	1% ADDL COST		
1	Instruction	Staff ratio	Teacher	27.9358 :1	27.3000 :1	26.6925 :1	Neg Acc	100
2	Classroom Teacher	Annual Salary		8830.1758 $	9025.0000 $	9219.8203 $	Pos Lin	95
3	Classroom	Peak use %		93.1856 %	100.0000 %	106.8144 %	Pos Lin	30
4	Classroom	Raw unit rqmts		30.4729 Unit	33.0070 Unit	35.5361 Unit	Pos Lin	27
5	Classroom	Unit Acq cost		18.9630 $	20.6100 $	22.2570 $	Pos Lin	26
6.	Student Flow	Dropout rate		0.0631 %	1.0300 %	1.9799 %	Pos Acc	22
7.	Principal & Staff	Annual salary		28700.0000 $	31673.6992 $	34647.3945 $	Pos Lin	22
8.	Classroom	Useful Life		56.0187 yrs	50.0000 yrs	45.1495 yrs	Neg Acc	21
9.	Classroom	Overhead %		54.6237 %	62.5450 %	70.4662 %	Pos Lin	16
10.	Classroom	Bond Maturity		17.1317 yrs	20.0000 yrs	22.8683 yrs	Pos Lin	14
11.	Classroom	Interest rate		5.4307 %	6.3400 %	7.2492 %	Pos Lin	14
12.	Instruction	Comp Factor 1	Teacher	0.1703	0.2005	0.2307	Pos Lin	14
13.	Classroom	Op cost/unit-day		0.0027 $	0.0033 $	0.0039 $	Pos Lin	12
14.	Classroom teacher	Fringe rate		6.3534 %	8.7000 %	11.0466 $	Pos Lin	8
15.	Classroom	Maint cost/$-yr		0.0122 $	0.0171 $	0.0220 $	Pos Lin	7
16.	Dist.admin.staff	annual salary		42930.1797 $	61884.8398 $	80839.5000 $	Pos Lin	7
17.	Multipurpose Rm.	Raw Unit rqmts		3.3389 Unit	5.8680 Unit	8.3971 Unit	Pos Lin	5
18.	Instruction	Other hour cost	Totals	0.0104 $	0.0199 $	0.0294 $	Pos Lin	4
19.	Principal's area	Raw unit rqmts		2.4830 Unit	5.0120 Unit	7.5410 Unit	Pos Lin	4
20.	Classroom furn.	Raw unit rqmts		22.6972 Unit	59.0800 Unit	95.4628 Unit	Pos Lin	3
21.	Instruction	Bk-av hour cost	Totals	0.0023 $	0.0118 $	0.0213 $	Pos Lin	3
22.	Instructnl.eqpt.	Raw unit rqmts		2.5948 Unit	18.9900 Unit	35.3851 Unit	Pos Lin	2
23.	Kitchen	Raw unit rqmts		low	2.2670 Unit	4.7960 Unit	Pos Lin	2
24.	Kitchen	Useful life		high	50.0000 yrs	15.4312 yrs	Neg Acc	1
25.	Dist.admin. area	Raw unit rqmts		low	2.1500 Unit	6.7519 Unit	Pos Lin	1

Note : This is an abbreviated Economic Factor Ranking, for display purposes. Rankings for most instructional programs contain between 100 and 300 key cost factors.

Education Turnkey Systems, "The COST-ED Model : A new Economic Tool for the School Administrator ", Washington, D.C.: Education Turnkey Systems, 1600 L Street, N. W., 1971. (Mimeographed)

III

STAFFING PATTERNS AND COSTS IN ALTERNATIVE EDUCATIONAL FUTURES

by

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SUMMARY

This paper has been prepared for the Organisation for Economic Co-operation and Development, who wished an assessment of innovative trends in education upon staffing requirements and costs. The OECD was especially interested in strategies which used instructional technology.

This assignment is not an easy one for the simple reason that we do not have enough practical experience as yet with innovations in instructional strategy - especially those which include substantial media use - to be able to make sound estimates.(1) This paper represents the results of taking the less satisfactory course of attempting to construct three or four scenarios of educational practices which we may reasonably hope to see in the 1980's and then tracing the staffing and cost ramifications of these.

In the first section, I briefly attempt to discuss the likely future ramifications of present-day educational innovation. Next are presented four future schools which seem likely given our conclusions concerning directions suggested by present reforms. In Section III staffing and cost ramifications of the schools are drawn. A final section contains a summary of the staffing and cost estimates along with some concluding remarks.

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(1) Hyer concludes similarly (11)*.

* Figures in brackets refer to References listed at the end of this paper.

I. DEVELOPING EDUCATIONAL FUTURES

Innovation proceeds in two stages, and both are important if we are to examine future directions. First there is the potential innovation inherent in the criticism of present practices, and second there is the observation of trends in innovative practices which are already underway. There is a confusing wealth of material in both of these areas, especially the former, and many would perhaps consider it foolish to attempt to reduce all this to one or two basics. Yet I have been impressed in reading and re-reading much of this material, including the most helpful review of Leila Sussman that there are indeed one or two basic notions that seem to run through much of this literature. The basic reform theme I find in both criticism and innovative practice is the need for more individualization of the educational experience. Dozens of pages could be devoted to the attempt to support this claim, but space will not permit such a discussion here. A short supporting statement is reserved for an appendix.

A second theme which I find involves criticism of the requirement in American schools that students know, at least briefly, a considerable corpus of factual material. Many critics seem to feel that the time could be put to better use either in improving such things as children's self-confidence, or for pursuing cognitive gains in lines of inquiry thought important by the student himself.(1)

There is nothing highly radical about the notion of having individualized attention of some meaningful kind given to students in American schools and I would guess that most parents would think it desirable. And yet we do not have many public schools where this is now true. Obviously, there must be other powerful social forces bearing upon American educational practices which are somehow in conflict with the individual attention ethic just enunciated. The unifying theme of these forces is not far to seek. It is the complex of reasons why schooling should be a common unifying experience for citizens of a nation. This is reinforced more so in a nation whose citizens' origins are very diverse, where there is required a "melting pot."

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(1) For example, Holt (10, p. 177): "We must ask how much of the sum of human knowledge anyone can know at the end of his schooling. Perhaps a millionth. Are we then to believe that one of the millionths is so much more important than another? Or that our social and national problems will be solved if we can just figure out a way to turn children out of schools knowing two millionths of the total, instead of one?"

This is a strong tradition in America and actual and potential school reformers have in the past seriously underestimated its underlying strength. It's existence can explain a great deal: the "lock-step" progression which is almost identical for everyone, the teaching of ethnic minorities facts about European history which are only of remote interest to them, choice of similar texts for all children in the state, and so on. Viewed in these terms we can also see why there is that emphasis upon cognitive attainment which school reformers criticize. Since mastery of considerable factual material leads to careers conventionally thought successful -- becoming members of learned professions for example -- it is only natural that all children should have this same chance.

Without stopping to present proof in great detail that these are the central, and in large part opposing, traditions in at least American education (beyond the material in the Appendix) I am going to proceed upon this assumption. Educational institutions of twenty years hence will probably reflect the outcome of a clash between these two viewpoints. Thesis and antithesis will produce some synthesis, but exactly where this process will come to rest is difficult to foretell. What seems obvious to a reasonably impartial observer is that neither tradition is likely to win the battle completely, although if some comes close to doing so it will undoubtedly be the conventional one, which has maintained itself virtually intact for three-quarters of a century in the face of sometimes very effective espousal of arguments for the virtues of individualism which are almost identical to those heard widely today. This was especially true in the 1930's.(1)

The central inquiry in this paper concerns the form this synthesis will take. Since we have little actual experience which has obtained the kind of synthesis thought necessary, this kind of crystal-ball gazing is fraught with hazards which (correctly) produce significant inhibitions to the careful researcher. But once these are overcome, perhaps it is possible to have at least some reasonable hunches on the matter. First, the strength of the common-education-for-all tradition is such that I think it highly unlikely that the synthesis will be a radical departure from present practices. Society will insist that a certain level of common experience and exposure to cognitive material be maintained, and while small splinter schools may remain, a tiny number even conceivably in the public sector, the great bulk of public schools will satisfy this requirement. On the other hand, I do not think the old methodology will escape unchanged this time, even though it is true that it has adopted almost none of the reforms suggested in the 1930's and since.(1) There are several reasons for this. First, in the 1930's when innovation was at hand, the country lacked the resources to provide decent schools of any kind, much less innovative ones. America is much more affluent in the 1970's. Secondly, there is no mistaking the stridency of criticism abroad in America today. Almost no responsible educational scholar believes in maintaining anything near the *status quo*.(2) Third, there is for the first time the possibility of substituting non-human instructional devices at lower cost than the traditional teacher in the self-contained classroom.(3) If the first time costs are paid by someone, the pressure of these technological changes will provide a strong catalyst for change also.

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(1) The quotes from Waller's 1932 statements in Sussman(18) is one evidence of this; so are the findings of the *Eight-Year Study*(1) and the *National Youth Administration*: Schools of the late 1930's.

While it is perhaps reasonable to assume some synthesis of the two traditions, this does not pre-suppose one type of delivery system. It probably can be obtained with changes which range from a fairly small departure from current practice to ones that entail rather substantial organizational changes. Each of these can be envisioned in ways that are feasible in terms of cost. Indeed, since American education is widely decentralized, where one school district can adopt a new organization without disturbing its neighbor, I fully expect to see several instructional strategies existing in the 1980's side by side.

In the next section of this paper, then, are presented four different instructional strategies which in my opinion can achieve the desired synthesis between a common education tradition on the one hand and individualized learning experience on the other. While none is widely adventuresome, they are, if anything, perhaps a bit further towards individualization than we are likely to see in the 1980's, although balanced adjustments which entail somewhat less individualization are not difficult to make. One strategy does not depart greatly in relative terms from present practice; a second would change significantly in terms of basic organization, while a third would do this plus add substantial amounts of educational technology. A fourth strategy would be even more of a radical departure in that part of the learning experience would routinely take place outside the walls of the traditional school building.

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(1) See Pincus (16).

(2) See, e.g., Averch *et al* (2) Chapter 7.

(3) See Hayman and Levin (7).

II. FOUR INSTRUCTIONAL STRATEGIES LIKELY IN THE 1980's

A. School One: Adapted Traditional

The first future school we shall discuss would not raise too many eyebrows in most American schools today. It is somewhat different according to age group and so elementary and secondary versions are discussed separately.

(1) Elementary Schools

Perhaps it might be wise to describe a conventional American school so we will know what we are comparing. The following describes the elementary school my children attend in Montgomery County, Maryland, which is a school district which is both quite traditional in outlook and quite affluent. For the first six grades (I will omit discussion of kindergarten) there are 16 teachers for 409 children, for an average class size of 25.6. However, one teacher teaches ten "catch-up" children (children having difficulty keeping pace in any one of the six grades) and thus the pupil teacher ratio for the other 15 teachers is 26.6. The range in class size is 24 to 32. Besides these teachers there is a sizable list of traveling teachers, para-professionals, and auxiliary personnel as follows. The teachers may all be considered to be specialists in their field:

Reading	2.5 days per week
Phys. Ed.	3.0 " " "
Speech	1.0 " " "
Instrumental Music	1.0 " " "
Art	1.0 " " "
English (as second language)	1.5 " " "
Nurse	0.5 " " "
Librarian	2.5 " " "
Library Aide	5.0 " " "
Teacher Aide	5.0 " " "
Total Certified	3.2 Full Time Equivalent
Total Non Certified	2.0 Full Time Equivalent

Basic instruction occurs in the self-contained classroom where most pupils encounter the same experiences and are responsible for basically the same work although it is undoubtedly true that the individual teachers give individual assignments, advice, and the like from time to time to individual pupils. There is also some individualized instruction by the specialists, although much of this is for pupils not keeping up and presumably associated with some sort of stigma therefor.

It should be obvious that with these resources the Montgomery County schools have moved to a position where individual attention is possible already, and the exceptional teacher is probably providing a fair amount although this is made difficult by rather inflexible curriculum requirements.

Let us now consider which changes would be required of the school just described which would make it possible for each child to have a significant individualized learning experience similar to Kohl's open classroom,(1) or perhaps in the Friends school described by Sussmann.(2) This is only one design thought reasonable out of what must be at least dozens of possibilities. Half the day would stay the same, while during the other half the pupils will be divided between two teachers each of whom proceeds on an open classroom basis. If we assume for simplicity an average class size of 28, this would mean an additional teacher for each 56 children (however classes of 30 or even 32 could probably be easily handled under this arrangement). It would probably be expedient for proper supervision to have a half-time para-professional aide to deal with each class as well. It would also be good if the second teacher were trained in diagnostic-prescriptive techniques and be skillful as a counselor.

This arrangement could prove quite flexible and during the open classroom part of the day instruction could utilize a number of aids, including programmed learning materials in books or through a computer terminal, use of tape recorders to improve writing and speaking skills, and so on. Another variant might be to have part of the traditional part of the day's instruction be done with instructional television or even instructional radio.

The other traveling teachers could be retained, although perhaps reduced in quantity. They could contribute to the open classroom or individualized instruction approach during the individualized part of the day as well.

---

(1) Kohl (14).
(2) (18).

(2) Secondary School

Traditional secondary schools in America typically have specialized teachers who teach several classes a day (usually fifty minutes in length) in one or at most two subject areas. Students travel from room to room for their classes and have either four or five "subjects" per day.(1) Instruction is strictly the same for all students; there is very little individualization.

A variation of the above which would add a significant individualization dimension in high school might be to have one or two fewer solid subjects per year (for a total of three or four) and have either two or three periods each day devoted to small seminars and individual tutoring where the direction of inquiry is into subjects of interest to the student. If this were in the true spirit of the open classroom(2) possible lines of inquiry would include such things as building and repairing automobile engines, studying flower growing, etc. and therefore staffing problems would occur. To deal with these it should be possible to enlist community members to help in instruction, perhaps in return for a small hourly stipend. True individual involvement by the student would probably also require considerably more in-depth interviews and counselling of students by counsellors and teaching staff. I envision a typical student's day then of consisting of half (or perhaps two-thirds) regular courses as now, and then the other half (one-third) day having a configuration where one teacher is the team leader for eighteen students in a facility where each has his own desk (shared with one student who uses it the other half day). Students are grouped according to their choice with teachers whose general interests are known (subject to obvious constraints). Teachers delve into the interests of each individual student, requiring them to make inquiry into areas of interest and to write papers or give reports recorded into a tape recorder. The atmosphere is informal. The teacher also works with any student who may have learning problems in special areas if they show interest in doing so. If the student shows some interest in some vocation, avocation, or community activity, the teacher attempts to arrange for auxiliary instruction by some person in the activity indicated -- the county treasurer's office or the beauty parlor as examples. There is also available one school psychologist for in-depth discussions for each 100 students. The teacher tries to develop group projects where several students have similar interests, and seminars are held to discuss such subject matter.

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(1) Typical in grade 10 (age 16): English Literature, Spanish (or French), Solid Geometry, Social Studies, World History, and Study (or Gymnasium) Period. For a four-subject schedule the language would be absent.

(2) See Sussmann (18).

B. School Two: The Differentiated Classroom Without Substantial Technology

As has been pointed out many times, American education is possibly one of the last of the cottage industries, in that all educational tasks are commonly entrusted to a single worker -- the teacher in the self-contained classroom. But the learning experience is diverse, and this would suggest that classical tools of specialization might be applicable for education as well as manufacturing projects. For example, Joyce has pointed out seven functions of the teacher, cooperative group leader, organizer of others, conveyer of information, therapist, self-instruction specialist, instruction resource specialist, counsellor, subject matter specialist.(1) Presumably some teachers are more adept in some of these functions than others. Or, if we look at the instructional process, there is some need for lecture, some for discussion in large classes, some for discussion and interaction in small seminars and tutorials, some for drill-skill practice and so on. The organizational plan which can arrange to utilize specialization and division of labor is differentiated staffing. The idea is already well known and it has been tried with seeming success in a number of American school districts. It has the advantages of being quite flexible and of establishing a much more satisfying teacher career progression (or so it would seem). Because of its flexibility, differentiated staffing could achieve the synthesis discussed above between a uniform educational experience and individualization.

The chief management of day to day instruction that obtains with differentiated staffing plans comes from a Master-Teacher/Team-Leader, who may direct a team of several senior teachers, staff teachers, associate teachers, and para-professional aides. The Master Teacher along with his or her senior teachers, using guidelines set down by the school principal, will decide upon the schedule for the perhaps 150 students for whom he is responsible. (Grouping of children for the responsibility of each team can be based on either the children's age or along subject lines).

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(1) Joyce (13, p. 111).

Traditional subject matter is covered as the Master Teacher sees fit, with some teachers assigned to lecture, some to lead discussion sessions, and others (perhaps beginners or para-professionals) to help students with drill-skill practice sessions. In addition, individual needs, problems, and interests are identified, with teachers and aides again assigned to deal with such needs according to their specialized abilities. With this organization it only takes the proper decision by the principal and Master Teacher to assign some teachers to the task of engaging in individualized instruction with the students at stipulated times of the school day. Such functions as counselling and evaluation can easily be subsumed by different members of the team as well. Indeed the flexibility is such that the potential variations in program and curriculum are almost endless.

Let us assume an elementary school containing 450 children. A possible differentiated staffing plan for such a school might include three teams, each responsible for 150 children in two-year age intervals. Each team would have the following members:

One Master Teacher - He or she is responsible for all instruction for these 150 children along with the method of its presentation, subject only to constraints imposed by principals and district. For the traditional part of the instruction these constraints would be similar to those in present day schools -- textbook selection, etc. For the individualized part of the day the Master Teacher is free to design the program, subject to supervision from the principal.

Two Senior Teachers - Senior teachers are potential Master Teachers. They are highly competent teachers who can do some planning and management and who at the same time have some notable teaching skills -- some are perceptive discussion leaders, others are charismatic lecturers, etc. The Master Teacher of course tries to pick his senior and other teachers with as wide a menu of specialized strengths as possible.

Two Staff Teachers - Staff teachers are journeyman teachers. Most are fairly young who will move up later. There might be some persons in this category who have failed to move on to senior teacher but since the lot of a staff teacher is in itself rather pleasant (all teaching and very little supervisory or clerical chores) this should not present undue problems.

One Intern Teacher - Intern teachers are teachers who do not yet have the required credentials or are within the first year after obtaining them.

Three Full-Time Equivalent Para-professionals - Para-professionals are mothers, students, athletes employed during the off season, and any number of possible types of non-credentialed persons. We now know that numerous such persons are available in the community who do their assigned tasks excellently.

A school day in this proposed school could go as follows. There would be two formal class discussion periods each morning with English and Social Studies two days a week and Mathematics and Physical Science two days a week. The fifth morning would be used for discussion, review, special films, examinations, etc., at the discretion of master and senior teachers. Children would meet for lecture-demonstrations by the master teacher or senior teachers for 50 minutes in groups of 75 or 38, and then after a short break would meet in smaller groups of 25 to 30 for discussion of the same material led by an accredited teacher.

In the afternoon the first 60 minutes would be used in meeting in 6 groups of 25 for an open classroom type class, where the teacher would review some of the morning's discussion if the children wished, and otherwise would delve into topics of interest to the children. This hour would also be used for structuring and planning the last 90 minutes or so of the school day which would be devoted to individual work, small group sessions, seminars, counselling sessions, etc. There would be six para-professionals available during the afternoon such that there would be adequate supervision, with an adult-child ratio of about one to thirteen. More discussion of this kind of arrangement is included below where a similar but more complex configuration which uses technology is outlined.

It should be emphasized that the author is not proposing this organization as the best one. Undoubtedly it could be improved upon with experience. It may even be that some parts of the school, the first three grades say, would be best left with the self-contained classroom organization. But I believe that it is reasonable to suppose that the configuration is a good enough example of what would be required to give us helpful insights into the staffing and salary requirements of this type of school. This comment is generalizable to the other proposed alternatives as well.

C. School Three: Differentiated Staffing Using Substantial Inputs of Education Technology

If we expand our horizons to consider inputs of instructional technology, the advantages of differentiated staff organizations become even more apparent. To properly use such technology the organizational pattern in the school and school district becomes somewhat more complex, however.

Writers concerned with the use of non-human instructional resources have tended to define the term "instructional technology" rather broadly to include ongoing research and evaluation as well as actual instruction.(1) In this paper I will adopt a somewhat more narrow convention for the most part and define educational technology as "non-human instructional devices" unless otherwise indicated.

As with differentiated staffing without technology, it is difficult to predict what the use of educational technology will be in the U.S. twenty years from now. There are two features of both alternatives which make it seem reasonable that both (separately or together) are liable to be in much more common usage in the 1980's and these are their demonstrated flexibility, which would permit the desired synthesis as discussed above, and secondly, the fact that by the 1980's both will be quite competitive in cost terms with traditional methods. This is especially true with variations which use technology -- especially instructional television. Set against this, however, is the demonstrated resistance of American educational institutions to change.

The employment of educational technology envisioned here is that termed by Hyer "Level Two" usage, where media are substituted for some functions performed before by the regular classroom teacher. Now the master teacher not only directs the members of his team in human teaching roles, he must decide when and how he will employ non-human instructional devices. Thus the level of expertise required of this person is considerably greater than when there is no technology present, because now he must not only be very well informed concerning the specialized skills and capabilities of his or her staff members, but also have a good command of the strengths and weaknesses of technological instructional methods, including technical aspects, strengths and weaknesses of media types for different instruction aspects, and costs. In short, this would become a fairly demanding middle management level type of position of the type for which managers in the U.S. get paid in the $20,000 to $30,000 salary bracket.

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(1) Hyer adheres to the broad definition promulgated by the Commission of Educational Technology, that educational technology is "a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication, and employing a combination of human and non-human resources to bring about more effective instruction (11).

Beyond the use of technology, the remainder of the organization would be similar to the differentiated staffing organization presented above. However, because of scale economies that obtain where media used is concerned, the Master Teacher - Team Leader would also have to interact with other parts of the school district in ways that would call for additional coordination from higher management. The production of video tapes in a subject might require cooperation between a number of teachers in the district if the material is to be kept relevant to the particular school district. Otherwise the district will rent or buy tapes which are produced commercially (presumably of very high quality). In the former case, especially, substantial coordination will be required and skillful management above the Team Leader level will be required.

Let us try to visualize a hypothetical working day of one instructional group in an elementary school that is responsible for the schooling of 240 children aged 8 and 9 (present grades 3 and 4) where technology is widely available. As with the differentiated staffing school discussed above, but even more so, the general problem which is faced by the principal, master teacher, and senior teachers as they design the instruction is how to achieve the kind of freedom they want for the children in order for them to pursue their own interests, while at the same time maintaining standards for what is learned and keeping control over what is taking place at the school. All this is not easy and thus the ability levels (and salary levels) required for staff will be much more demanding than those in present schools. Costs are discussed in more detail below.

Besides staff resources similar to those described above for School Two, the principal and master teacher have the following technical resources at their disposal.

- Television lecture - Series of high quality. Nationally prepared course sequences and special programs. We assume there would be several channels available for use at the same time and several school districts may cooperate in transmission.
- Television presentations originating in the school district. These are lecture-demonstration type programs, although it is also possible to have a question-asking capability since the television can have a two-way capability.

- Television presentations originating in the school building.
- Television review of some lectures available to small groups of students or individuals by using video tapes available in the school library.
- Audio instruction contained on tapes in cassettes. Students can replay tapes as often as they wish. Earphones and audio sets are available for about 20 per cent of the students to use at a given time.
- A number of computer terminals, perhaps 40 for a school of 700. Half of these have an audio capability. Numerous software instructional packages are available by merely punching the correct sequence. These include instruction packages of the drill-skill type in arithmetic, language, logic, typology in biology, etc. Also available are courses in some subjects such as grammar, arithmetic, logic, which can be taught in a logical branching sequence.
- Various types of programmed instruction books that, perhaps with the aid of a para-professional, can give drill-skill type instruction at less cost than using a computer terminal.
- Conventional textbooks, workbooks, material for getting children started on various units of experiment, etc.

As in School Two, subject matter which would be taught these children in four areas: Language, Number Studies, Social Studies, and Natural Studies.

The School Day

Let us assume a school day, exclusive of lunch time, of six hours (360 minutes) although it is reasonable to make it possible for interested students to stay longer for work at a computer console, etc. The school concentrates on giving students the required common educational experience in the morning and individualized instruction in the afternoon. Standard curriculum topics are covered in the afternoon also, but with a more individualized approach. As in School Two, the chief instructional material in the lecture mode for each subject is given twice weekly. For example on Monday and Wednesday mornings there are Language and Social Studies presentations, each lasting 85 minutes and consisting of a televised lecture (probably produced beyond the school district for the most part but with a school district originating component as well) of 45 minutes, a ten minute break, and follow-up discussion sessions of 30 minutes conducted by a senior or staff teacher (perhaps the master teacher or teacher intern sometimes). The same would take place for Mathematics and Natural Science on Tuesday and Thursday. On Friday, the teachers use the time for whatever they wish, review, examinations, discussions, etc.

Having used half the day for structured cognitive pursuits, this leaves the other half, or 180 minutes, to be used as desired, including individually tailored instruction. This could include discussion groups of various sizes, independent work with computer console or audio-cassettes, discussions with teachers for counselling purposes, independent study, or visits to facilities such as factories and museums, off the school campus. It would also (presumably) include some time in open-classroom type activities. The main problem encountered for this type of activity is how to keep control, i.e., how does the staff insure that the various tasks being undertaken by the children are all reasonably productive? This control problem would not be easy to resolve, but the solution is probably to insure a low ratio of children to adults. One way to go about it would be to have the first hour of the afternoon broken into six classes of 25 children each (or five of 30 each). The children could be grouped by type of interest perhaps. During this hour there is an open classroom type activity where the teacher in charge works to find out which kinds of activities are indicated for the rest of the afternoon according to the wishes of the children and recommendations of the counsellors. The last two hours of the day are then taken up by all the different kinds of activity mentioned above. Since there are six para-professionals as well as six teachers, it should be possible for some adult to keep track of and direct each individual child during this period without any loss of control.

D. School Four: Part of the School Day Not In School

There is a final possibility which would at the same time achieve the synthesis discussed above, reduced costs, and increased quality. It involves a larger departure from American tradition and therefore may not obtain recognition because of other societal constraints. It would entail receiving instruction in the home part of the day with television (perhaps with two-way audio capability) and using ordinary telephone lines for interaction with computer capabilities. One third to one-half of instruction could take place in the home in this manner. The part of the day spent in the school building could include counselling, small seminars, and other individualized modes as well as standard lecture-discussion classes.

The societal constraint which will inhibit such an instructional strategy is of course the demonstrated demand of parents that their children from age 6 to 17 be out of both house and street during the hours from 8 a.m. to 4 p.m. five days weekly and otherwise accounted for. If this constraint is ever breached, such configurations will be feasible. In any case the method has obvious potential for adult instruction.

III. RESOURCE COSTS IN THE FOUR FUTURE SCHOOLS

Let us turn now to consideration of likely cost ramifications for the various resources required by the four alternative schools discussed above. For the two schools which do not require much educational technology this is not very difficult, but cost patterns in those having substantial media use are not quite as obvious. Fortunately, there is some helpful recent work on costs in educational technology which are quite helpful.

Costs of present practices are merely descriptive statistics. Other staffing costs in this section will be developed hypothetically on the basis of the types of skills which I consider necessary and my own perception of what remuneration such skill combinations command in present day U.S. labor markets. An attempt is made to abstract from fixed building costs which are common to all methods. When additional space and equipment needs are indicated by one particular mode, however, they are included. Cost estimates have been designed to be, if anything, somewhat high, since the conservative path is the better one for such speculative ventures.

A. For Comparison: The Traditional School of the Present

Education Teaching Systems, a school research firm, has made a careful study of educational costs by function. The original costs are two years old and therefore I am inflating them by 10 per cent and rounding off to the nearest meaningful number. The important ones for our purposes are (per pupil per year):

Teacher	$400
Classroom	120
Principal and Staff	90
School District Administrative	30
TOTAL	$640

We will ignore other inputs such as cafeteria, transportation, etc. which would normally add perhaps another $200 per pupil. These are assumed identical no matter what the mode or else specific notice will be taken.

B. Adapted Traditional Schools

The adapted traditional elementary school is assumed to be different from the present day school in only three ways. They are:

- For a half day the pupil-teacher ratio is cut in half and a para-professional aid is added. The extra teacher is assumed to have specialist training and therefore to earn $2,000 more per annum than regular classroom teachers.
- An extra facility is needed for every two classes (since one can use it in the a.m. and one in the p.m.). I assume this extra facility only needs to be half the size of a regular classroom.
- Perhaps some additional supervision by the principal is necessary to insure cooperation between the two teachers involved with each set of children.

Costs per pupil of these changes (assuming 28 children per class) are:

Additional Cost (Per Pupil Per Year)

Additional Teacher	$215
Para-professionals*	135
Principal and Staff	30
Additional Classroom Space**	60
	$440

---

* Salary is figured at $3.50 per hour for a 180 school day year.

**This figure was also cross checked with calculations using school building data and square footage requirements. The alternative method yielded a figure of about $50 per pupil per year.

TABLE 1

Summary of Instructional Costs and Staffing Requirements, Four Instructional Alternatives (Per 1,000 Students)

I. Conventional School		
A. Primary School		
36.6 Teachers		$366,000
B. Secondary School		
28.5 Teachers		285,000
6 Counsellors		72,000
	TOTAL	$357,000
II. Adapted Conventional School		
A. Primary		
36.2 Teachers		$362,000
18.1 Specialists		217,000
Additional Facilities		60,000
Additional Principal & Staff		30,000
	TOTAL	$669,000
B. Secondary		
46.0 Teachers		$460,000
5 Counsellors		60,000
Additional Facilities		60,000
Additional Principal & Staff		30,000
	TOTAL	$610,000
III. Differentiated Staff School		
6.66 Master Teachers		$ 93,240
13.32 Senior Teachers		159,840
13.32 Staff Teachers		119,880
6.66 Intern Teachers		43,290
6.66 Resource Teachers		79,970
46.62 Total Accredited		$496,220
19.98 Para-professionals		75,924
Additional Facilities		60,000
Additional Principal & Staff		30,000
	TOTAL	$662,144
IV. Differentiated Staff With Technology		
4.16 Master Teachers		$ 87,360
8.32 Senior Teachers		133,120
16.64 Staff Teachers		166,400
4.16 Intern Teachers		27,040
33.28 Total Accredited		$413,920
16.64 Para-professionals		63,230
1.39 Administrators		20,850
Additional Remuneration, Principals		20,000
	TOTAL Staffing Costs	$518,000
Additional Classroom Facilities		60,000
Media Costs		200,000
	TOTAL	$778,000
If two fewer staff teachers per team		- 83,200
	TOTAL	$694,800

Note: Since the figures in this table pertain to hypothetical constructs, they should be interpreted only as approximations which serve as useful guides to our thinking. This is true with the figures in Tables 2-5 also. If the reader has other ideas concerning the design of future schools, he should be able to adjust the figures for one of the four schools accordingly.

TABLE 2

Summary of Additional Costs Beyond Those of Present Conventional Schools, Three Instructional Alternatives That Include Individualized Instruction, For One Million Children

Type of School	Additional Cost ($)
Adapted Conventional	303,000,000
A. Primary	303,000,000
B. Secondary	244,000,000
Differentiated Staff	326,000,000
Differentiated Staff Technology Using	
A. Normal	412,000,000
B. With two fewer staff teachers per team	328,000,000

TABLE 3

Summary of Staffing Needs, Four Instructional Alternatives, Four One Million Children

Type of School	Accredited	Non-Accredited
Present Conventional	36,600	
Adapted Conventional		
A. Primary	54,300	
B. Secondary	51,000	
Differentiated Staff	46,600	20,000
Differentiated Staff		
Technology Using* Normal	33,300	16,600
With two fewer staff teachers per team	25,000	16,600

*Also 1,400 school administrators.

TABLE 4

Total Wage Bill For Instructors, Four Instructional Alternatives, For One Million Children

Type of School	Total Wages ($)
Present Conventional	362,000,000
Adapted Conventional	550,000,000
Differentiated Staff	
Accredited	496,000,000
Non-Accredited	76,000,000
TOTAL	572,000,000
Differentiated Staff	
Technology Using	
A. Normal	
Accredited	434,000,000
Non-Accredited*	84,000,000
TOTAL	518,000,000
B. Two Less Staff Teachers Per Team	
Accredited	351,000,000
Non-Accredited*	84,000,000
TOTAL	435,000,000

*Includes Administrators.

TABLE 5

Estimated Salaries For Accredited Teachers, Four Instructional Alternatives, With 5, 10, and 20 Years Experience

Type of School	5 Years Experience	10 Years Experience	20 Years Experience
Present Conventional	$ 8,500	$10,000	$12,000
Adapted Conventional*	9,100	10,600	12,600
Differentiated Staff	9,000	10,500	12,000
Differentiated Staff			
Technology Using	10,000	13,000	16,000

*The higher salaries in adapted conventional over present conventional reflects the greater use of specialists only. Salaries for non-specialists would stay the same.

This could be reduced considerably by increasing the overall teacher-pupil ratio in the school, which should not be objectionable given the intensive help each teacher now receives during half the school day. Increasing the ratio 10 per cent would recapture about $80 of this additional expenditure for a new increase of $360. Total instructional expenditure then increases from $640 to $1,000 per pupil per year.

The adapted secondary school would be somewhat more costly because part of the day being replaced would include study and gymnasium periods, where student teacher ratios of 100:1 are often maintained. Assuming the present high school student averages 1.5 study and gymnasium periods per day, the additional yearly cost per pupil would be as follows:

Teacher	$200
Psychologist	120
Classrooms	60
Principal & Staff	30
TOTAL	$410

C. Differentiated Staffing

Differentiated staffing plans would place management responsibilities on the principal, master teacher, and senior teacher which are greater than those required presently from the classroom teacher and therefore it seems reasonable to expect these people to be paid accordingly. Therefore I assume annual salaries which are higher than those given by the firm of Cresap, McCormick, and Paget in their report to the President's Commission on School Finance.(1)

For School Two then, I assume the following personnel and costs for 450 pupils. (See next page)

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(1) While the CMP estimates were apparently based upon actual practice and therefore deserve a considerable measure of credence, it does not seem reasonable that a master teacher's salary is only equal to that of an average classroom teacher.

Personnel	Salary	Cost
Three Teaching Teams Comprising:		
1 Master Teacher	$14,000	$14,000
2 Senior Teachers	12,000	24,000
2 Staff Teachers	9,000	18,000
1 Intern Teacher	6,500	6,500
3 Para-professional Aides	3,800	11,400
TOTAL		$73,900
Times 3:		221,700
3 Resource Teachers	12,000	36,000
Additional Principal and Staff		13,500
TOTAL		271,200
Per Pupil		$ 603

The indicated total instructional cost is not much more than many conventional programs today.

D. Differentiated Staffing With Technology

As we indicated above, the smooth functioning of a school system which used considerable non-human instructional resources would require personnel with considerable management ability. The following are the salary schedules I visualize for School Three.

Personnel	Annual Average Salary	
Principal	$24,000	$22,000-$26,000
School Administration	$15,000	$12,000-$18,000
Master Teacher	$21,000	$18,000-$24,000
Senior Teacher	$16,000	$12,000-$20,000
Staff Teacher	$10,000	$ 8,000-$12,000
Intern Teacher	$ 6,500	$ 6,000-$ 7,000
Para-professional	$ 3,800 ($3.50 per hour)	

In a school which uses media extensively, it would probably be preferable that administrative units be somewhat larger and therefore the following staffing plan assumes that each master teacher is responsible for 240 students. A fairly rich staffing arrangement for such a group would be:

1 Master Teacher
2 Senior Teachers
4 Staff Teachers
1 Intern Teacher
4 Para-professionals
(Full-Time Equivalent)

The largest staffing bottleneck in School Three is the necessity for an accredited person to meet daily with a small group of children (30 in our example) for open classroom instruction and the planning of individualized activities. The staffing arrangement just given would allow these classes to meet all at the same time. With better scheduling this would not be necessary and it would be possible to get by with one or two fewer staff teachers. Adding charges for principal, administrator, and administrative staff (assuming a school of 720 children) we arrive at a per pupil cost of $565 per year. With two fewer staff teachers the cost would be $482. To this must still be added the cost of instructional technology.

Capital Costs

We have a recently completed manuscript by Hayman and Levin which carefully reviews the costs of educational technology as they appear at this time. We should remember in thinking about the future that additional improvements and further economies of scale in all these areas will mean that we can be reasonably certain that there will be no increase in costs of these resources over the next decade or two, unlike teacher costs which will probably drift upwards considerably over that time period. This is especially true with computer hardware and software, which should decrease in cost (per unit of output) over the next two decades.

The figures on the following page are based directly upon the Hayman and Levin estimates, which are quite adequate for our purposes. Since the main purpose of this paper is to deal with staffing costs, detailed material, some of which gets somewhat tedious, is not included.

High School

The preceding example has been concerned with the elementary school level. However, I see one of its virtues as being easily adaptable to other levels. The para-professional would not be necessary, perhaps, but the other staff requirements are reasonably similar to the elementary school example. Technology requirements different from those just given are more difficult to foresee. We will use the $200 figure for high school as well, although it may be somewhat on the low side.

Instructional Television, 90 minutes per day for 150 children, meeting in four groups, assuming the existence of at least several dozen small groups in the viewing area.

Software	
(.15 per student viewing hour)	
Per student per year	$ 32.40
Production	
($.07 per student viewing hour)	
Per student per year	15.12
Reception	
($.10 per student viewing hour)	
Per student per year	21.60
Total, ITV, per student per year	$ 69.12
Computer Terminal Costs	
($.40 per student use hour)	
Per student per year	14.40
Audio Cassettes, etc.	
Per student per year	25.00
Programmed Instruction Materials, etc.	
Per student per year	20.00
Total, Technology	128.52
(Rounded)	130.00
Additional Classroom Space	60.00
GRAND TOTAL	$190.00

It would seem reasonable to expect that technology costs, once the first time costs have been paid, would be in the area of $200 per student per year.

E. School Four

Little needs to be said about the costs of School Four. Obviously, if one-third of the school day could be transferred to the pupils' own home, then approximately one-third of the instruction (but not management) cost would be saved. On the other hand it may be necessary for the school to give the parents of children a yearly stipend to cover some of the costs of specialized equipment.

IV. IMPLICATIONS OF THE SCHOOLS UPON FUTURE COSTS AND STAFFING

Table 1 summarizes the staffing and cost requirements comparing the present day conventional school and three innovative schools. The fourth school, where students stay home part of the day, is not analyzed because we know very little concerning any home equipment costs and also because it would only involve a percentage reduction in the costs of the technology using school. All three schools which include individualization involve a fairly sizable increase in expenditure but the differences in cost between the three future schools themselves are not sizable. In examining Table 1, it should be recalled that the cost figures for conventional schools are for instruction only, and therefore it is not fair to compare the costs for present schools and those given for the three future schools in percentage terms. .

An idea of the broad cost and staffing ramifications of the schools described in this paper can be obtained from Tables 2 and 3 which are presented on the basis of the needs of one million school children. In Table 2, if the last six zeros are dropped from the figures, the reader will have the additional expenditure per pupil per year which each school would cost, ranging from $244 to $412. Perhaps it might be safe to say that the nation could include a quality individualized instruction aspect to its education at a cost of around $300 per pupil. If half as much were done, at $150 per pupil, the results may still be quite worthwhile. Since differentiated staffing plans are more flexible but require a certain cost threshhold, it is quite likely that plans involving very large changes would allow for much greater future efficiency if they involved differentiated staffing.

In terms of staffing (Table 3), the number of accredited teachers goes up substantially in both the adapted-conventional and differentiated-non-technological plans and these alternatives would undoubtedly be quite popular with teacher groups. However, it should be noted that technology alternative A would require only a nine per cent reduction in requirements for certified staff.

Table 4 presents the total instructional wage bill for each alternative. As we might expect the wage bill for the technology-using schools is less than either of the other schools with individualization included, although it should also be noted that the technology-using school still requires a larger sum for accredited teacher salaries than under present practice using one staffing assumption. Even with the more modest staffing plan, the wage bill is almost as great. Thus, while technology-using strategies would require fewer teachers, the remaining ones would be treated to a better standard of living. This is also made clear by the rough estimates given in Table 5 for salary levels based on the reasoning given for staff requirements given in the discussion of the schools above.

APPENDIX

INDIVIDUALIZATION OF INSTRUCTION AND EDUCATIONAL REFORM AND CRITICISM

That individualization of instruction seems to be implied by an almost preponderant amount of educational criticism and innovation seems to be almost beyond question, but in this brief appendix let me present some substantiation taken from what I consider to be quite typical educational criticism and also innovation.

1. Educational Reform as Suggested by the Critics

There is, especially in America, a considerable and growing body of literature by critics who have been a part of American schools and who have found much wrong with them. These writers use what has been termed, in a review of educational research partly written by the author, the experiential approach, which "states in effect that the most important thing about schooling is the way in which school experiences affect students' lives and self-concepts, both while they are students and for the rest of their lives."(1) Averch *et al* go on to show that to these critics such things as school procedures are essentially irrelevant unless they affect students' self-concept, teacher-student and student-student transactions, and attitudes towards social institutions that students develop. Quite obviously, when we discuss such things as *student* self-concept, relations by *students* to their teachers and other students, and the attitudes of *students* to social institutions, we have gone a long way from treating students as one of a group and are obviously thinking of each as an individual.

As we discussed in the text, there is a strain in most of the criticism against the need for great learning conformity of cognitive skills. Almost anywhere one looks in the critical literature one can find this type of criticism. For example, one of our more respected critics, Friedenberg, notes that society and the traditional school:

> "firmly and sincerely believes that people should cooperate with their immediate social order, and that people who don't are troublemakers who come to a deservedly bad end. They are genuinely suspicious of, and hostile to, people who insist on their own privacy and dignity against group demands. They are

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(1) Averch *et al*, (2, p. 126).

> convinced that strong feelings and loyalties are hazardous, and that it is not merely unwise but wrong to allow such commitments to jeopardize one's future chances."(1)

Another writer, Henry, puts this even more strongly:

> "the function of education has never been to free the mind and the spirit of man, but to bind them; and to the end that the mind and spirit of his children should never escape Homo sapiens has employed praise, ridicule, admonition, accusation, mutilation, and even torture to chain them to the culture pattern ... Contemporary American educators think they want creative children, yet it is an open question as to what they expect these children to create. And certainly the classrooms -- from kindergarten to graduate school -- in which they expect it to happen, are not crucibles of creative activity and thought ... From the endless pathetic 'creative hours' of kindergarten to the most abstruse problems in sociology and anthropology, the function of education is to prevent the truly creative intellect from getting out of hand."(2)

And, Herndon:

> "As long as you can threaten people, you can't tell whether or not they really want to do what you are proposing that they do."(3)

Holt:

> "Almost all children are bored in school ... very little in school is exciting or meaningful even to the upper middle class child; why should it be so for some children? Why, that is, unless we begin where schools hardly ever do begin, by recognizing that the daily lives of these children are the most real and meaningful and indeed the only real and meaningful things they know."(4)

And Kohl:

> "As far as (teachers and supervisors) are concerned the content of the curriculum has mandated by a Board of Education or a curriculum committee, and it is the teacher's role to follow the curriculum. A good teacher like a good soldier, is one who obeys orders."(5)

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(1) Friedenberg, (6, p. 11).

(2) Henry, (8, p. 286).

(3) Herndon, (9, p. 98).

(4) Holt, (10, p. 68).

(5) Kohl, (14, p. 89).

The central criticism in the quotations just given obviously seems to be that society and schools are forcing students to study material that is chosen by others, and neither they nor their parents directly have any participation in the choice and not only is the choice made by others, it is often a very poor choice.

It is obvious also what the reformers are after when we read some of their prescriptions for education. (Although they are notoriously disparate in their more concrete recommendations.) As Averch et al state, much of this centers upon the concept that has come to be known as the "open classroom" in which the student is allowed to investigate and discover for himself the things he wants to learn.(2, p. 140) An excellent discussion of open classrooms is Sussman.(18) Open classrooms that are successful have structure which is introduced unobtrusively but where it is possible for students to pursue their own interests as long as they obtain a minimum grasp of required material. Many writers have taken more extreme stands, and argued against compulsory school of any kind. The most famous is Illich (12), but even Friedenberg can be found in this category. While there does not seem to be much agreement on the exact way schooling should be structured in the future, most of these writers discuss individualization to the interests of the students and open classroom types of concepts. Examples are Silberman, Kohl, Holt, Friedenberg, and many others (17, 14, 10, 6). Many of these instructors have participated in teaching situations, often with supposedly "disadvantaged" children in which they have succeeded in getting the children interested in school work through writing of themes, preparing class newspapers, using tape recorders, etc. In at least one case, that of Kozol, the apparent success of the individual teacher was accompanied by dismissal by his school district.*

Individualization is a theme often mentioned in the very fine survey of educational futures done by Educational Inquiry(5). In their discussion of schools in the 1980's they conclude that the directions for educational goals of the 1970's are:

1. An increase in goals emphasizing the development of the individual and non-cognitive domain.

2. A continued emphasis upon goals emphasizing the subject matter orientation of schools.

3. Some attention being paid to the examination of the problems of society and mankind as goals of the school (5, "Education in 1980", p. 15).

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*Kozol, (15).

It should be added here that much of the material in the text of this paper was indirectly influenced by the Educational Inquiry report and is, I think, not inconsistent with the trends they identify.

(2) Implications From Innovative Practices

We have, of course, had a considerable experience now with innovative schools in America, although very few of these have been inside the public sector itself. Almost all of these in my opinion include individualization of instruction as one of the main forces in their approach. The only other major recurring theme I seem to find besides individualization is flexible staffing. The latter is of course also prominently used in the school scenarios constructed in this paper.

One idea that has been tried in experimental form in a number of places in the past few years has been that of performance contracting. In performance contracting a private firm is given a contract to raise the reading or arithmetic performance (usually) of children from disadvantaged backgrounds with payment reserved for the instances in which the children achieve beyond a certain minimum. As the Rand Corporation studies of one set of these experiments show (3), almost every contractor has included diagnosis of individual learning aptitudes and problems in his regimen.

There is also some experimentation within the public sector with the open schools concept. This is especially true in the State of North Dakota. While I have not seen any reports giving thorough evaluations of the North Dakota experience, it would appear that a key feature of the instruction is that students are allowed to follow their own interests part of the day in certain parts of their school work. This activity is then especially connected to writing activities.

One of the better discussions of innovations in schools that I have seen is that by Sussmann for the OECD. Again, I think a careful reading of the innovations Sussmann discusses all lead one in the direction of individualization of instruction. Sussmann herself seems to indicate this in summarizing the Newport, Illinois, High School modular scheduling innovation when she concludes: "The heart of the Newport innovation goes back to the main thesis of this paper: the objective is to give students more autonomy and to change as far as possible in a non-authoritarian direction"(18). Indeed, the modular schedule for the Newport High School is, according to Sussmann, sometimes called an "individualized flexible schedule."

Another innovational high school discussed by Sussmann is the Walt Whitman Middle School (18). Here the innovation is a team-teaching staffing approach which in itself probably does not demand individualization of instruction. In this instance of innovation, utilization of specialized teacher skills seems to be the important thing. However, the flexibility of these types of arrangements, plus some of the examples given by Sussmann (students producing television shows) leads one to suspect that there is much more individualization of instruction in this school than in most traditional schools.

In most of the other programs discussed by Sussmann, the individualization of instruction is a central goal. For example, in the continuous learning program in Newton, Massachusetts, the students within limits select the curriculum they will follow and agree to fulfilling their own objectives having agreed to specifically stated goals. There are House Advisers who have frequent conferences with individual students and the student is allowed an hour of unscheduled time each day for participating in a number of activities, including consultations, library work, or pursuing individual interests at a resource laboratory. Incidentally, from this Newton Junior High School we have one of the few sets of believable cognitive test results for an innovative school, and these show that there were statistically significant differences in favor of the CLP students. Sussmann also gives other examples of open education type schools, all of which have as their goals considerable individualization of instruction, but, it should be carefully noted, not all of which were uniformly successful.

Sussmann ends her paper on a somewhat pessimistic note. She feels that because of the additional hard work (and it is hard work) involved in true open classroom and individualized type instruction, major changes in society and schools will be required to have this kind of instruction on an ongoing basis. Perhaps this is correct; if so, the part of the schools designed in the main part of this paper which has to do with individualization would have to be deleted. This could be easily done in any of the schools as indicated in the text. But as I stated above, I feel that there are reasons why some modification of American schools in the next decade or two will be forthcoming. Admittedly, the change may not be as great as that designed into the alternative schools in this paper. The crystal ball has not yet become one of the dependable tools of science.

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